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THE SECOND DENVER MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Edited by Dr. F. R. MOULTON
PERMANENT SECRETARY

INTRODUCTION

FROM June 21 to June 26 the one-hundredth meeting of the association was held in Denver, Colorado, the fiftieth meeting also having been held in Denver (in August, 1901). This was not only the centenary meeting of the association, but it was the first joint meeting of the association with the Pacific Division and the Southwestern Division. These divisions provided two splendid evening general sessions open to the public and, together with their twelve cooperating societies, contributed greatly to the success of the meeting. Altogether 28 affiliated societies participated in the scientific programs, at which nearly 600 papers were read.

A committee, of which Dr. James J. Waring was chairman, was in charge of the local arrangements for the meeting. Dr. Waring is a past president of the National Tuberculosis Association. He was assisted by Dr. T. P. Campbell, vice-chairman; Dr. A. C. Nelson, treasurer; Dr. Joyce C. Stearns, secretary; and a number of other persons prominent in educational and civic affairs in Denver. Through the efforts of the local committee it was possible to hold nearly all the sessions in downtown halls, conveniently located to the hotels.

The president of the association, Dr. George D. Birkhoff, was unable to be present at the meeting because of European engagements. He was represented by Dr. Edwin G. Conklin, retiring president.

REGISTRATION AT THE DENVER MEETING

Registered attendance numbered 763, but this number does not give the total attendance. It is estimated that at least 1,200 persons attended the various scientific sessions. About 575 papers were read, including those in several notable symposia, which were a feature of the meeting. And in addition to the papers, there were numerous field trips arranged by several sections and societies.

Those who registered reported residences from the United States as follows: Colorado, 237 (of whom 149 were from Denver); California, 96; Utah, 41; Illinois, 32; District of Columbia, 30; Massachusetts, 29; New Mexico, 26; Wyoming, 23; New York, 22; Kansas, 19; Arizona and Washington, 18 each; Texas, 17; Minnesota and Nebraska, 14 each; Oklahoma, 13; Wisconsin, 10; Idaho, Iowa and Pennsylvania, 9 each; Missouri, 7; Connecticut and Montana, 6; Maryland, Oregon and Ohio, 5 each; Virginia and New Jersey, 4 each; Arkansas, Nevada and South Dakota, 3 each; Florida, Michigan and North Dakota, 2 each; Kentucky, Louisiana, Maine, North Carolina, South Carolina, Vermont, Virginia and West Virginia, 1 each. Hawaii was represented by 2 registrations. Canada was represented by 8 members; Quebec, 1; Saskatoon, 2; Vancouver, 2; and Victoria, 3; while England and Czechoslovakia were represented by 1 each.

At the first Denver meeting there was a total registration of 311 members, of whom 79 were from Colorado, and about 200 papers were presented.

GENERAL SESSIONS

All the evening general sessions were held in the Silver Glade Room of the Cosmopolitan Hotel. The audiences attending these sessions filled the room to its maximum seating capacity. The Tuesday evening program, presented by the Pacific Division, with Dr. B. M. Allen, of the University of California at Los Angeles, presiding, was devoted to the retiring address of the president of that division, Dr. Herbert M. Evans, professor of biology and director of the Institute of Experimental Biology of the University of California. The subject of Dr. Evans's address was "The Development of our Knowledge of Anterior Pituitary Functions."

On Wednesday evening the sixth Maiben Lecture was delivered by Professor Nevil V. Sidgwick, F.R.S., of Lincoln College, Oxford, England. Dr. Edwin G. Conklin, of Princeton University, retiring president of the association, presided. The subject of Professor Sidgwick's lecture was "Molecules," in particular the conditions under which the molecules involved in life processes can be formed and transformed. It is expected that this address will be published in an early number of SCIENCE.

The third evening general session consisted of the John Wesley Powell Lecture of the Southwestern Division, which was delivered by Dr. A. E. Douglass, professor of astronomy and director of the Steward Observatory, University of Arizona, who spoke on "Tree Rings and Chronology."

SPECIAL EVENTS

One of the outstanding features of the Denver meeting was the symposium on "The Scientific Aspects of the Control of Drifting Soils," which was held under the joint auspices of the Ecological Society of America and the association, with Dr. David Shaw Duncan, chancellor of the University of Denver, presiding. Three invited papers were read. The first one was by M. M. Leighton, chief of the Illinois State Geological Survey, the title of which was "The Geological Aspects of the Drifting Soils." Dr. Leighton considered the nature, importance and examples of the geological factors involved and the cardinal principles to be learned from the geological record. F. E. Clements, of the Division of Plant Biology of the Carnegie Institution of Washington, read the second paper on "Climatic Cycles and Human Population." Dr. Clements discussed plant cover in relation to erosion and flood as an ecological process. The third paper was delivered by H. H. Bennett, chief of the U. S. Soil Conservation Service, who spoke on "Emergency and Permanent Scientific Control of Wind Erosion." Dr. Bennett discussed the nature of the human problem and the factors involved in wind with special reference to emergency control *vs.* permanent control.

The second item in the list of special events was a series of moving pictures which were shown in the Silver Glade Room of the Cosmopolitan Hotel on Tuesday afternoon. The subjects were "Body Defenses Against Disease" and "The Heart and Circulation of Blood," by Dr. A. J. Carlson, and "Exploring the Universe," by Dr. Walter Bartky. These films were made available by the University of Chicago.

On Monday evening the officers and visiting members of the association were guests of Chancellor David Shaw Duncan and trustees of the University of Denver at an informal reception held in the Mary Reed Library of the university. The attractive interior arrangement of this building offered a splendid setting for the reception, which was attended by more than 600 persons.

RADIO PROGRAMS

Facilities of the radio stations of the National Broadcasting Company and of the Columbia Broadcasting System were frequently placed at the disposal of the association, both before the meeting and particularly during the meeting. The address of Dr. Evans, somewhat abbreviated, was broadcast over the

blue network of the National Broadcasting Company on Tuesday afternoon. The Columbia Broadcasting System carried over a national hook-up a broadcast by the officers of the association on Wednesday. On Thursday an abbreviation of the address of Dr. Douglass was broadcast over the red network of the National Broadcasting Company. The Denver broadcasting stations KLZ, KOA and KVOD carried a large number of local broadcasts by members of the association.

BUSINESS SESSIONS

The executive committee and the council held several sessions during the Denver meeting for the transaction of business. The following items are of general interest to members of the association.

The Committee on the Theobald Smith Award announced that Dr. Robley D. Evans, Massachusetts Institute of Technology, had been selected as the first recipient of this award for his work on the "Application of Physics to the Problems of the Detection and Treatment of Radium Poisoning."

The council approved the organization of a series of five conferences, the first to be held at Indianapolis, and the others to follow at successive meetings of the association on the general subject of "Science and Society."

Dr. J. G. Lipman, New Jersey Agricultural Experiment Station, New Brunswick, N. J., was elected chairman of the committee on grants.

The council approved a new constitution of the Pacific Division.

The council voted to change the boundary of the Southwestern Division by substituting "West of the 100th Meridian" for "West of the Pecos River."

Dr. F. R. Moulton was appointed representative of the association in the Division of Foreign Relations of the National Research Council.

Dr. W. H. Howell was nominated the association's representative in the American Documentation Institute.

The council approved the appointment of Dr. Glenn L. Jenkins, University of Minnesota, as a member of the executive committee of the Subsection on Pharmacy.

The council reaffirmed the resolution establishing the association's attitude on national parks, as follows:

The American Association for the Advancement of Science, representing through its sections and affiliated societies all of pure and applied science, from time to time expresses its opinion on scientific problems of broad public interest. In conformity with this custom, the Association at this time reaffirms the following Resolution passed by its Council ten years ago.

A RESOLUTION ON THE MAINTENANCE OF THE HIGHEST STANDARDS IN THE SYSTEM OF NATIONAL PARKS OF THE UNITED STATES

(Adopted by the Council, December 28, 1927)

Resolved, That the American Association for the Advancement of Science

(1) Approves the creation of those national parks only which meet the highest standards of the System, namely, which are wholly or almost wholly areas of original, unmodified natural conditions, each a unique example of its landscape or geologic type in the country; and

(2) Declares that, as the only reservational system for preservation of the primitive and majestic in nature, the protection inviolate of the system of national parks demands extraordinary watchfulness and care; and

(3) Recognizes that, by reason of its peculiar limitations and conditions, the system of national parks possesses facilities for popular education in nature and for inspiration, which have incalculable value to individuals and the nation.

The council unanimously voted to accept the following proposal and to express to Dr. and Mrs. Cattell the thanks and appreciation of the council for their generous gift:

The Executive Committee of the American Association for the Advancement of Science at its meeting in Atlantic City on December 27, 1936, received from Dr. J. McKeen Cattell a proposal dated December 25, 1936, to transfer the ownership of *The Scientific Monthly* and *American Men of Science* to the American Association for the Advancement of Science upon his death or on his relinquishment for any cause of the control of these publications, subject to three stated conditions, namely:

"(1) That the present arrangement between the Association in regard to *Science* and *The Scientific Monthly* or some other arrangement adopted by mutual agreement is at the time in effect; (2) that there shall be paid to Josephine Owen Cattell (who has cooperated in the editorial and business conduct of these publications) or her heirs for a period of ten years an annuity equal to half the average annual net profits of the publications during the five years preceding its acquirement by the Association, and (3) that the arrangements for editing, publishing, and printing the publication, in effect at the time of its acquirement by the Association shall be continued so long and in so far as this is consonant with the interest of the Association." Since the Atlantic City meeting, the proposal as to the transfer of the *American Men of Science* has been withdrawn, pending the publication of the sixth edition.

The Executive Committee at its meeting on December 27, 1936, expressed its grateful appreciation and hearty thanks for this generous proposal of Dr. Cattell, and in order to examine more carefully the conditions named in the proposal, it appointed a Subcommittee consisting of Edwin G. Conklin, *chairman,* Burton E. Livingston and George D. Birkhoff to inquire into these conditions and to report back to the Executive Committee. Neither the first nor the third of these conditions seems to require

serious consideration for the reason that they are capable of being altered by mutual agreement or whenever the interest of the Association may warrant it. The second condition requires more detailed examination. Dr. Cattell has supplied the Subcommittee with a statement of the receipts and expenditures in connection with the publishing of *The Scientific Monthly* for the years 1932 to 1936, inclusive, which shows that the average annual balance of receipts over expenditures for the five years named was $4,127.65. A detailed classification of the expenditures for the years named includes the costs of printing, reprints, paper, engraving, mailing, rent, postage, supplies and salaries. If the average receipts and expenditures for the five years preceding the acquirement of *The Scientific Monthly* by the American Association for the Advancement of Science should be approximately the same as for the years 1932 to 1936, the Association would be under obligation to pay to Mrs. Cattell or her heirs about $2,000 a year for a period of ten years, but if the average surplus for those ten years remained the same as for the preceding five years, the Association would gain $2,000 a year and at the end of ten years would have a valuable property free of incumbrance, which at present interest rates would represent a capital worth about $100,000.

The Subcommittee is unanimously agreed that Dr. Cattell's proposal is a very generous one and that it will be of much present value to the Association and may in the future become of still greater value. We, therefore, recommend that it be accepted with hearty thanks and that the President and Permanent Secretary of the Association be authorized and directed to take such steps as may be necessary therefor and to enter into and to execute a contract for this transfer of *The Scientific Monthly* from its present owner to the American Association for the Advancement of Science, in conformity with the terms of the proposal of Doctor Cattell dated December 25, 1936, and that this action be reported to the Council at the Denver meeting.

(Accepted by the Council, June 25.)

Before adjournment the council unanimously adopted the following resolution:

The American Association for the Advancement of Science and its affiliated societies express their deep appreciation to the citizens and institutions of Denver for their invaluable services in connection with preparing for and carrying out the numerous programs of the Hundredth Meeting of the Association, which was held in Denver from June 21st to June 26th, 1937.

A strong local committee efficiently took care of many important business matters, including printing the program of the meeting and providing rooms and equipment for the numerous scientific sessions; it assumed the onerous duties of registration of members and visitors; it arranged for interesting excursions and delightful social events; and, with characteristic western hospitality, it made visitors feel a real welcome to Denver. The excellent educational institutions in Denver and elsewhere in Colorado contributed greatly to the success of the meeting.

The local daily papers were generous in carrying preliminary announcements of the meeting and in publishing reviews of many of the scientific papers. The radio stations carried about thirty broadcasts, three of which were over national hook-ups. In short, from the very beginning of the preparations for the meeting to its final close, the citizens and institutions of Denver rendered services to the Association and its affiliated societies which the council hereby gratefully but inadequately acknowledges.

SCIENTIFIC SESSIONS

SECTION ON MATHEMATICS (A)

(Report from E. R. Hedrick)

The meetings of the Section on Mathematics (A) were held in conjunction with the Section on Social and Economic Sciences (K), the Econometric Society and the American Statistical Association, on Thursday morning and afternoon, June 24.

In the morning session, under the chairmanship of C. F. Roos, four papers were presented: "The Application of Functionals in Economics," by Harold T. Davis; "The Economic Meaning of Functionals," by Gerhardt Tintner; "Incidence of Taxation in a Simplified General Equilibrium," by R. W. Shephard; "Stability of Régimes of Cooperation and Competition," by G. C. Evans and Kenneth May.

In the afternoon, under the chairmanship of E. V. Huntington, the following papers were presented: "Applications of Index Numbers to the General Economic Equilibrium," by F. W. Dresch; "A Certain Index Number as a Mean," by E. L. Dodd; "Relations among Coefficients of Regression and Correlation as a Basis for Statistical Inference," by Holbrook Working.

SECTION ON PHYSICS (B)

(Reports from Henry A. Barton, Paul Kirkpatrick, R. E. Tipton, J. C. Alter and W. B. Pietenpol)

Following the practice at Christmas meetings, the meeting of the Section on Physics (B) was held jointly with the American Physical Society, Joyce C. Stearns presiding.

The Saturday morning program consisted of a symposium of invited papers on "Cosmic Rays and High Altitude Effects." Joyce C. Stearns described the Mt. Evans high altitude laboratory and pointed out its usefulness as a research station in various scientific fields. Thomas H. Johnson then read a paper on "Further Experiments with the Geomagnetic Cosmic-Ray Effects and Their Bearing upon the Nature and Energy Distribution of the Primary Cosmic Radiation." The third paper was on "The Nature of the Penetrating Cosmic-Ray Particles," by J. C. Street, who concluded that the penetrating particles are something new—probably possessing the same charge as an electron but having greater mass. The fourth paper was on "The Importance of Observations from the

Upper Atmosphere in Long Range Weather Forecasting," by Hurd C. Willett.

The American Physical Society held on this occasion its regular summer Pacific Coast meeting. The Friday morning session was a symposium on "Astrophysical Problems of the Ionosphere," held jointly with the Section on Astronomy (D) and the Astronomical Society of the Pacific, Philip Fox presiding. This interesting symposium of invited papers consisted of "Fundamental Mechanisms in the Ionosphere," by N. E. Bradbury; "Terrestrial Magnetic Variations and the Ionosphere," by A. G. McNish; "Sudden Disturbances of the Ionosphere," by J. H. Dellinger; and "Bright Chromospheric Eruptions," by R. S. Richardson. The symposium brought out the considerable degree of association between phenomena in the upper atmosphere of the earth and the spectacular eruptions and activity on and above the surface of the sun. On Friday afternoon, R. E. Nyswander presiding, several short papers were presented on the subject of cosmic rays, their effects in the laboratory and at high altitudes, and as a function of time and atmospheric conditions. Other papers dealt with topics in the fields of thermodynamics, x-rays, apparatus for research on the atomic nucleus, ultrasonics and the photographic study of lightning.

The Saturday morning session was held jointly with the Section on Physics (B). On Saturday afternoon, W. B. Pietenpol presiding, a number of short papers were read on a variety of subjects, several of which dealt with ionization in gases at various pressures and temperatures. The ionization along cosmic-ray tracks was discussed. Other papers described experimental studies of electrode surface and other phenomena in gaseous discharges. One paper described a sensitive method for determining the age of rock samples by measuring their radioactivity and helium content. There were additional papers on spectroscopy and optical effects. A new design of air-driven ultra-centrifuge was described and its biological applications indicated.

The American Meteorological Society held four sessions on Monday, Tuesday and Wednesday. Edgar W. Woolard opened the first session with a geometrical theory of the formation of halos. Joseph Kaplan followed with a proposed method for determining pressures in the upper atmosphere by comparing spectroscopic analyses of auroral lights with results obtained in laboratory experiments. L. F. Miller reported some observations on present sun-spot groups studied by the magnetic and total solar intensity of solar radiation methods at the Steward Observatory, of Tucson, Ariz.

The Tuesday morning session was opened by Stephen Lichtblau's discussion of upper air cold fronts, combining observational and theoretical data to show the movements of upper air masses of different types. T. R. Reed followed with further observations on the North American high level anticyclone and the distinctive weather conditions produced, which brought down to date a series of similar maps and studies made to 1932. Dean Blake reported and explained the movement of an unstable tropical air mass aloft over the far West on August 7, 1936, which had a notable effect on the weather in certain places. George F. Taylor discussed occurrences and properties of Polar Basin air, or Great Basin air masses. O. T. Larsen closed the session with a narrative-discussion of the relationship between airline dispatching and aeronautical meteorology.

The Tuesday afternoon session was held jointly with the Institute of Aeronautical Sciences, at which W. R. Gregg presented a paper on the application of the cold front theory to practical meteorological forecasting.

The Wednesday morning session was opened by George F. McEwen with a discussion of certain energy relations between the sea surface and the atmosphere; this subject was also discussed by H. U. Sverdrup. J. C. Alter presented the results of some recent experiments on shielded storage precipitation gages, with especial reference to preventing losses by evaporation and to stabilizing the catch of snowfall. J. C. Jensen related some evaporation and rainfall studies made in northwestern Minnesota. W. V. Turnage reported on some rainfall-altitude studies made by himself and T. D. Mallery in southern Arizona, showing variations between summer and winter increases with altitude.

The American Association of Physics Teachers held sessions on Thursday, June 24, in conjunction with the section on Physics (B). At the morning session fifteen papers were presented on teaching methods, demonstration experiments and laboratory apparatus. The afternoon session consisted of a symposium of invited papers on the preparation of physics teachers for secondary school work. Among those participating were Homer L. Dodge, W. B. Pietenpol and Joyce C. Stearns. A more complete report of the sessions has been sent to *The American Physics Teacher*.

The Section of Hydrology of the American Geophysical Union had its first session on Monday morning and its program continued throughout the week, with a total of forty-four papers. The first session was held under the auspices of the Denver Regional Committee, R. J. Tipton, *chairman*. The Tuesday programs were joint sessions with the Society of American Foresters. The programs were concluded at luncheon on Saturday.

Although the primary purpose was to discuss the

hydrological problems of the Rocky Mountains and the South Continental Divide, papers of national interest and of concern to other regions were also presented. The first part of Monday's program was devoted to a general discussion of the objectives of the American Geophysical Union and of the section by N. H. Heck, president of the union, and L. K. Sherman and J. E. Church, chairman and vice-chairman, respectively, of the section. Then Merrill Bernard presented "Hydrologic Aspects of Flood Forecasting." In the afternoon water temperatures in reservoirs, return flow and valley consumptive use were discussed. The joint session on Tuesday included outstanding papers on land use patterns to control erosion by W. C. Lowdermilk, epicycles of erosion by Reed Bailey and streamflow stabilization from the points of view of the forester by C. L. Forsling and from the standpoint of the hydrologist by Robert E. Horton. The Wednesday papers were devoted to rainfall and runoff and dynamics of streams. Papers on floods in the west were presented by Robert Follansbee, Robert Lowry and R. J. Tipton, while R. S. Goodridge discussed "Some Interrelationships of Rainfall and Infiltration Intensities." A topic of very general interest, "Forecasting Sleet for Highways," was read for Salvatore Pagliuca. Carl B. Brown presented a valuable study of the U. S. Soil Conservation Service on "Rates of Silting in Representative Reservoirs throughout the United States." Underground waters and physics of soil-moisture were the general topics on Thursday morning. Included were "Prospecting for Water with Geophysical Methods," by C. A. Heiland, and "Apparatus for Studying Water Relationships in Potted Plants," by L. A. Richards. The afternoon was held open for the symposium of the Ecological Society of America. On Thursday evening an informal dinner of the section was held at the Denver Athletic Club. Friday and Saturday mornings were given up to the South Continental Divide Snow Survey Conference. The topics included the present status of snow surveying in the West, snow survey apparatus, different phases of snow courses, relations between snowfall and runoff, research projects and application of snow course data.

Friday afternoon was devoted to sightseeing. Some of the members of the section visited Ralston Creek Dam and Coors Brewery in Golden. At the luncheon on Saturday at the Denver Athletic Club, H. L. Potts presented "Forecasting Runoff by Photos of Snow" and a movie film of snow surveying in the High Sierra, shown through the courtesy of the Los Angeles Department of Water and Power. Then followed a round-table presentation of snow surveying experiences and problems. The executive committee of the Section of Hydrology met at various times during the session and discussed matters of interest to the section. Among them was the possibility of initiating the program of flood wave research. The Denver Regional Committee consists of R. J. Tipton, *chairman,* R. L. Parshall, R. E. McArdle, R. Follansbee, I. E. Houk and S. Shulits.

SECTION ON CHEMISTRY (C)

(Report from Neil E. Gordon)

The Section on Chemistry (C) held three half-day sessions. At the first session, with Farrington Daniels serving as chairman, O. A. Beath reported on animals of certain sections of the Rocky Mountain region that are subjected to various diseases and ultimate death by eating certain plants of that region containing selenium. C. S. Gilbert described properties and composition of a new uranium ore. Miss Edith Lantz presented an investigation of the loss of vitamin B from the pinto bean under various methods of cooking, finding that pressure cooking in distilled water is best. William M. Craig reported on investigations of the possibility of obtaining potassium on a commercial basis from some of the salt lakes of Texas and New Mexico, the results relating to potassium having been obtained in connection with work on the sodium sulfate and salt cake contents of the waters. The element lithium was also found in the lakes.

In a paper entitled "The Use of Vapor Pressure Curves in the Study of Homologous Series," F. E. E. Germann reported finding that each substance has a characteristic curve when its vapor pressure is plotted against the temperature. F. E. E. Germann and Charles F. Metz presented a paper on "Ions *vs.* Molecules in the Study of Magnetic Double Refraction of Solution." They reported that the presence of unpaired electrons in ions leads to different magnetic properties, measurements of which permit one to determine whether or not the material under investigation is in the ionic form. In another paper entitled "The Mechanism of the Dark Reaction Following the Photolysis of Malachite Green Leuco-Cyanide," F. E. E. Germann and Charles LeRoy Gibson found that the green color is bleached by the absorption of light and that in the dark the green is slowly restored. Contributions to the study of fluorides in drinking water, which are very deleterious to teeth, were presented by Willet R. Willis. He stated that an activated alumina had been reported which furnishes a satisfactory removal of the fluoride. Ralph W. G. Wyckoff gave a paper on "The Ultracentrifugal Isolation and Analysis of Virus Proteins." He has found that proteins which constitute some of the virus diseases can be studied successfully by concentrating them with this high-speed equipment.

At the final session of Section C, J. W. Hershey pre-

sented a paper on "Experiments on Microscopic Synthetic Diamonds," in which he reported producing diamonds one millimeter in length. Farrington Daniels, William Manning, J. F. Stauffer and B. M. Duggar presented a paper on "The Efficiency of Photosynthesis of Chlorophyll in Green Algae." They reported that the amount of carbon dioxide and water converted into plant material by each unit of sunlight was from 10 to 20 per cent. less than previously supposed. Paul C. Cross read a paper on "The Raman Spectrum and the Structure of Water." He showed that the spectrum of light scattered by liquid water (Raman spectrum) may be interpreted in terms of a structure for liquid water which recognizes the presence of nine species of water molecules corresponding to different types of association with neighboring water molecules.

SECTION ON ASTRONOMY (D)

(Reports from Harlan T. Stetson and H. H. Nininger)

The Section on Astronomy (D) held joint sessions with the Astronomical Society of the Pacific on Thursday with a program contributed chiefly by members of the western observatories. Seven papers from the Dominion Astrophysical Observatory contained results of spectroscopic studies with the 72-inch reflector. W. E. Harper reported the identification of three expanding shells of gas which caused the 150,000-fold sudden increase in brightness of Nova Lacertae in 1936. The largest shell showed a velocity of 3600 km/sec., the greatest ever found in a galactic nova.

The Mount Wilson Observatory was represented by five contributions, dealing with solar, planetary and stellar problems. The next sun-spot maximum was set by S. B. Nicholson and Mrs. Mulders for the beginning of 1938. W. S. Adams and Theodore Dunham reported failures to detect any water vapor in the atmosphere of Mars, thus reversing tentative conclusions from earlier investigations.

E. C. Slipher described recent work in planetary photography in six different spectral regions. The results gave confirmatory evidence that Mercury keeps the same face to the sun throughout its orbital revolution and that the solid surface of the planet Venus has never been seen through its cloudy atmosphere.

A paper from the Berkeley Astronomical Department of the University of California dealt with a group of asteroids having about half the period of Jupiter. Joseph Kaplan exhibited slides showing some results of a study he is making of auroral afterglows. Glow discharges in tubes of gas so rare that exposures of from two to twenty days are required to give spectra similar to that of the upper atmosphere. N. W. Storer explained and demonstrated a mechanism for duplicating the motion of a particle in a Keplerian ellipse of eccentricity 0.4.

In an invited supplementary discussion, J. S. Plaskett and Warner Seeley explained the progress being made in the construction of the 82-inch reflecting telescope for the MacDonald Observatory. Novel features in the mounting were described.

On Friday morning, the Section on Astronomy (D) and the Astronomical Society of the Pacific held a joint session with the Section on Physics (B) and the American Physical Society, at which four invited papers presented certain problems of the upper atmosphere of especial cosmic interest. J. H. Dellinger reported on sudden disturbances of the ionosphere accompanying recognized solar outbursts. A paper written by R. S. Richardson told of the observation of bright chromospheric eruptions observed at the Mount Wilson Observatory that were undoubtedly associated with the more conspicuous fadeouts reported by Dellinger. N. E. Bradbury, speaking on "Fundamental Mechanisms in the Ionosphere," reviewed the evidence derived from radio phenomena that several ionized layers having different properties exist in the upper atmosphere, and also the evidence that this ionization is caused by the sun. A. G. McNish discussed "Terrestrial Magnetic Variables and the Ionosphere." The startling fact was mentioned that the sun's ionizing radiation appears to increase from sunspot minimum to maximum by a factor 16.

The secretary of the section is indebted to N. W. Storer for acting as secretary *pro tem.* at the Denver meetings and supplying the information upon which this report has been largely based.

The Society for Research on Meteorites met for its fifth annual meeting in the lecture room of the Colorado Museum of Natural History on Tuesday morning, Wednesday morning and Wednesday afternoon. On Tuesday afternoon the society met in joint session with the Section on Geology and Geography (E). Fifteen papers were read in the independent sessions, and eight papers were presented at the joint session.

At the Tuesday morning session a paper by L. A. Kulik, of the Russian Academy of Science, was read by R. W. Webb, presenting some new facts regarding the great meteorite fall of June 30, 1908, in North Central Siberia. For the first time the finding of silica glass and small inclusions of nickeliferous iron were reported in connection with this great fall. H. H. Nininger reported and exhibited an iron meteorite which was seen to fall near Norfolk, Arkansas. Ralph Meeker, Jr., presented the results of an investigation to determine whether there is evidence of a cyclical recurrence of the fall of any of the varieties of meteorites, and also whether there is a periodical variation in the number of falls. He obtained nega-

tive results in both cases. Miss Julia Smead presented by means of charts and diagrams the results of an investigation to determine whether there is a relation between the frequency and distribution of meteorite falls.

More than eighty persons were in attendance at the Tuesday afternoon joint session, which was devoted to a symposium on meteorite craters, a subject which appears to lie quite as much in the field of geology as in meteoritics. F. A. Melton reviewed the varied and lengthy discussion which has followed the announcement, in 1933, of his hypothesis regarding the origin of the Carolina Bays. Wm. F. Bingham gave a résumé of the explorations and findings at the meteorite crater near Winslow, Arizona. L. J. Spencer's paper on "Meteorites and the Craters on the Moon," which lately appeared in *Nature,* had been submitted by its author and was read by the secretary of the society. H. H. Nininger presented photographic illustrations of the process of excavating the Haviland, Kansas, meteorite crater. J. D. Boon presented a paper on "Meteorite Craters and Structures" under the joint authorship of Claude Albritton, Jr., and himself. The authors mentioned several examples of what are probably the remains of such structures and suggested that many others may be recognized in various stages of erosional defacement. R. T. Chamberlin gave an illuminating discussion of "Earth Shells." H. A. Meyerhoff read a paper by Alfred C. Lane on "Meteorite Contributions to Sediments." R. D. Evans read a paper by W. D. Urry on "Age-Determination of Meteorites from their Radioactivity." Lincoln La Paz discussed the distribution of meteorites, and also tektite distribution. Charles Fenner, of the University of Adelaide, South Australia, contributed an interesting paper on Australites. The closing paper was the address of the retiring president of the society, Frederick C. Leonard.

At the Wednesday meeting Mrs. Addie D. Nininger presented a list of one hundred meteorite discoveries reported to the society in the period 1933–1937, fifty-three of which had been made in the surveys of the Nininger Laboratory in the middle western states. The oxidation of meteorites was discussed in papers by John Davis Buddhue and L. F. Brady. Mr. Buddhue also presented a paper on "The Composition of Meteoritic Iron Sulfide."

The following officers of the Society for Research on Meteorites were elected for the quadrennium 1937–41 and took office at the adjournment of the meeting: *President,* H. H. Nininger, Colorado Museum of Natural History and American Meteorite Laboratory, Denver, Colo.; *First Vice-President,* C. C. Wylie, University of Iowa; *Second Vice-President,* W. F. Foshag, U. S. National Museum, Washington, D. C.; *Secretary,* Robert W. Webb, University of California at Los Angeles; *Treasurer,* L. F. Brady, Mesa Ranch School, Mesa, and Museum of Northern Arizona, Flagstaff, Ariz.

SECTION ON GEOLOGY AND GEOGRAPHY (E)

(Reports from Howard A. Meyerhoff, C. L. Utterback, and H. A. Hoffmeister)

The section began its program on Tuesday afternoon when it met in joint session with the Society for Research on Meteorites, Frederick C. Leonard presiding. Unfortunately the length of the program left little opportunity for discussing the eight papers offered, which dealt with such factual subjects as the scientific investigation of meteorite craters, such problematic questions as the origin of the craters on the moon and the crater-like "scars" in the coastal plain of the Carolinas, and such speculative matters as the possible meteoritic origin of the so-called cryptovolcanic structures in certain sedimentary rocks, and the significance of the earth's internal organization into shells or zones of different composition and increasing specific gravity. W. D. Urry's analysis of the age of meteorites as determined by the helium method was of interest in suggesting the possibility of differentiating between meteorites of solar and of extra-solar origin.

The section meeting on Wednesday morning, with W. C. Toepelman in the chair, was devoted to papers dealing with igneous, sedimentary and dynamic structures as illustrated in the Western States. W. O. Thompson oriented the group in the structures of the foothills along the Front Range, and in the afternoon these structures were examined in the field between Boulder and Longmont.

With F. M. Van Tuyl presiding on Thursday morning, L. R. Thiesmeyer made an excellent case for glaciation along the western margin of appalachia in early Cambrian or Lipalian time, by means of the circumstantial evidence offered by varved slates in Virginia and other South Atlantic states. The other contributors to the program covered a variety of stratigraphic, paleontologic and paleogeographic features in the Rocky Mountain region, ranging from the Cambrian to the Tertiary. The association's symposium on the control of drifting soils was adopted as the section's Thursday afternoon program.

Uniformly good attendance records were broken on Friday morning at the symposium on "Rocky Mountain Geomorphology," at which C. E. Dobbin presided. Both general and specific aspects of the subject were covered in a three-and-a-half-hour session, and areally the papers ranged through the Central and Southern Rocky Mountains, and from the High Plains and Black Hills to the Great Basin and Colorado Plateaus. Interest centered in the conflicting interpretations of

Cordilleran erosional history, and the conflict was brought into high relief in papers that argued, on the one hand, for one main period of mountain-leveling and, on the other hand, for cyclical dissection and partial planation of a mountain region that had undergone intermittent uplifts since the Laramide Revolution. In a paper, inadvertently omitted from the printed program, F. A. Melton brought out a sequence in the sand dunes of the southern high plains, revealing a radical shift in the direction of dune migration at the close of Pleistocene time.

The section's activities were concluded on Saturday by a field trip under the direction of F. M. Van Tuyl. Although a temperamental drizzle and low-hanging clouds cut down and at times annihilated visibility, they could not mask the pediments and step-like erosional levels which characterize the mountains between Golden and Nederland. The trip ended at Science Lodge, where P. G. Worcester and other geologists of the University of Colorado were the section's hosts at luncheon.

The Oceanographic Society of the Pacific met on Wednesday and Thursday. The annual luncheon was held at noon on Thursday. At the annual business meeting, held on Wednesday, the following officers were elected: *President,* E. G. Moberg; *Vice-President,* W. A. Clemens; *Secretary,* C. L. Utterback. Seventeen papers, including a stimulating symposium, were presented on various phases of oceanographic research. In the symposium on "Interrelations of the Sciences which Compose Oceanography," H. U. Sverdrup discussed the relation of physics to oceanography and noted the extensive contributions of physics to oceanographic research. A. H. Hutchinson considered the relation of marine botany to oceanography. The relations of marine bacteriology to oceanography were interestingly presented by B. S. Henry, who noted the various methods employed and expressed hope for a more nearly uniform technique among different investigators.

The Association of Pacific Coast Geographers held its annual meeting on Wednesday, Thursday and Friday, with scientific papers on Wednesday and Thursday mornings, Howard H. Martin presiding, and field trips on Wednesday afternoon and all day Friday. Twenty-four short papers were presented during the two morning sessions. The principal addresses were delivered at the two luncheon meetings. On Wednesday E. Earle Lackey discussed "Crop and Rainfall Expectancy in Nebraska," and on Thursday Howard H. Martin gave an illustrated lecture on "Colonization and Exploitation in Northern Japan." On Thursday afternoon the society joined in the general symposium on "The Scientific Aspects of the Control of the Drifting Soils." The Wednesday afternoon trip around Denver was under the guidance of Margaret F. Boos. Under the leadership of H. A. Hoffmeister, the group made a field investigation of mining and milling adjustments in the Idaho Springs-Central City area on Friday. Officers of the association for the coming year are: *President,* G. M. McBride, University of California; *Vice-President,* J. B. Leighly, University of California; *Secretary-Treasurer,* H. F. Raup, University of California at Los Angeles; *Yearbook Editor,* O. W. Freeman, Eastern Washington College of Education.

SECTION ON ZOOLOGICAL SCIENCES (F)

(Reports from George A. Baitsell, J. F. Lamiman, John W. Scott and Leo Shapovalov)

The Section on Zoological Sciences (F) met in joint session with the American Society of Parasitologists on Tuesday. The interesting program, arranged by John W. Scott, included a general session in the morning with a considerable number of papers centering around the geographical and taxonomic characteristics of the parasite, *Diphyllobothrium,* and its influence on certain hosts. In the afternoon there was a well-attended symposium on "The Rocky Mountain Spotted Fever Problem" at which important contributions from a number of leaders in this field were presented, including a paper on "Sylvatic Plague." Noteworthy papers were presented relating to the cimecid parasites of man and animals, siphonaptera of the Western States, penetration of larval parasites and life histories of some gregarine parasites.

Two general sessions of the section were held on Wednesday and Thursday mornings in which a wide variety of subjects were presented to interested groups of workers in the various fields. The discussion following most of the papers was lively and of great value and contributed to the success of the meetings. On Wednesday evening the members associated with Sections F and G joined in a Biologists' Dinner at the Hotel Argonaut, which was largely attended and productive of good fellowship among the workers in the various subdivisions of the biological field.

The Pacific Slope Branch of the American Association of Economic Entomologists held its twenty-second annual meeting on Thursday and Friday. During its sessions twenty-two papers were presented, including a number on grasshoppers and grasshopper control. C. P. Gillette gave an invited address on the "Adaptation to Environment in Super-Family Aphoidea." The Entomologists' dinner was held on Thursday evening, and members were addressed by C. P. Gillette and R. A. Cooley. Total attendance at the meetings was forty-five. The officers elected for 1938 were: *Chairman,* J. R. Eyer, State College, N. Mex.; *Vice-Chairman,* W. C. Cook, Modesto, Calif., and *Secretary-*

Treasurer, J. F. Lamiman, University of California, Davis, Calif.

The American Society of Ichthyologists and Herpetologists, Western Division, held its ninth annual meeting on Tuesday, which was attended by some forty members. Retiring President Rolf L. Bolin read Walter Mosauer's tribute to and review of the scientific career of Franz Werner, noted herpetologist and emeritus professor of zoology at the University of Vienna. Dr. Werner, whose seventieth birthday will occur on August 15 of this year, was recently elected honorary foreign member of the society.

Gordon Gunter presented a paper on studies on the relative abundance of several marine species on the Louisiana coast, with a short discussion of the evolutionary success of the various families and orders. Walter Mosauer and Edna Caney presented a paper on the anatomy and distribution of the spinal nerves of snakes. Slides were used to emphasize the authors' belief that detailed studies of the spinal nerves furnish the best means of interpreting homologies between the musculature of the snakes and the saurians. Types of plagiostome hypophysis were discussed by H. W. Norris, who stated that there are two chief types—selachoid, of the sharks proper, and batoid, of the rays. A paper on the fossil amphibian fauna of the middle Pliocene of Kansas was read by Edward H. Taylor. Five new species of extinct Anura from Sherman and Mead Counties, Kansas, bring the total described from these two localities to eight. A species of *Scaphiopus* from Sherman County appears to be closely related to living members of the genus, but one of the species from Mead County does not seem to fit into any known group. Species of extinct *Bufo* and *Rana* were also found. Rolf L. Bolin presented a paper on types of evolution expressed by the cottid fishes. A paper on frogs of the Hyla eximia group, with descriptions of new species, was read by Edward H. Taylor. Examination of three hundred specimens of this group from Mexico and the United States shows the presence of three known forms, *Hyla eximia, H. euphorbiacea* and *H. lafrentzi* and two new species, as opposed to two forms proposed by Kellogg in his recent monograph on Mexican frogs. *Hyla gracilipes* is here recognized as a synonym of *H. eximia.* A paper comparing the scales of Polyterus and Lepisosteus was read by T. D. A. Cockerell. A study of *Lepisosteus* (gar-pike) scales from Georgia called attention to their extraordinary resemblance to those of *Polypterus,* the African lung-fish. George F. Knowlton discussed the effectiveness of lizards in insect control. Migrations of fishes and amphibians in a California coastal stream were discussed by Leo Shapovalov. Observations in central California reveal unsuspected annual migrations of various fishes (*Cottus, Gasterosteus*), amphibians (*Rana, Triturus*) and reptiles (*Thamnophis*). Trout of different ages migrate seaward at different times of the year and, like the other animals, seem to be influenced in their migrations by the height of the water. Charles T. Vorhies showed motion pictures of the methods employed by the western diamond rattlesnake, *Crotalus atrox,* in swallowing full-grown Arizona cottontail rabbits. Close-ups revealed the use of fangs in drawing in large prey. A. M. Woodbury also used motion pictures to show progress in the location of rattlesnake dens. Fifteen rattlesnake dens in Utah and Colorado and two turtle dens in southwestern Utah were visited. The pictures illustrated a description of the denning habits of three sub-species of rattlesnakes, *Crotalus viridis viridis, C. v. lutosus* and *C. v. concolor,* and of the desert tortoise, *Gopharus agassizii.*

The following officers were elected: Major Chapman Grant, San Diego, Calif., *president;* Charles E. Burt, Winfield, Kansas, *vice-president;* Miss Margaret Storey, Stanford University, Calif., *secretary-treasurer.*

SECTION ON BOTANICAL SCIENCES (G)

(Reports from S. F. Trelease, L. D. Leach, A. S. Crafts, and L. L. Burlingame)

On Wednesday afternoon, with two hundred botanists in attendance, the Section on Botanical Sciences (G) met jointly with the Pacific Section of the American Phytopathological Society, the Pacific Section of the Botanical Society of America, the Western Society of Naturalists and the American Fern Society. Five invited papers were read by prominent botanists. Frederic E. Clements, in an address illustrated by beautifully colored lantern slides, summarized his investigations of the influence of the environment on expression in plant species. A. R. Davis spoke on the interrelationship of environmental variables in plant growth. J. T. Barrett reviewed his studies on some of the lower forms of parasitic phycomycetes. L. L. Burlingame discussed his observations on the anomalous inheritance of white anther in *Clarkia elegans.* R. B. Harvey summarized present knowledge of the conditions responsible for winter resistance in plants.

The meeting of the American Phytopathological Society, held under the auspices of the Pacific Division of the society, met in joint sessions with the Upper Mississippi Group of Plant Pathologists for the presentation of papers on Wednesday morning and on Thursday. Approximately forty pathologists, including the national president, G. W. Keitt, and the editor of *Phytopathology,* H. B. Humphrey, attended the meetings, at which fifteen papers were presented.

Of exceptional interest was a group of three papers concerning peach mosaic. The remarkable success of

the eradication program in Colorado was recounted by E. D. Bodine, who also reported evidence that the Maynard plum was a symptomless carrier of peach mosaic. L. C. Cochran and Lee M. Hutchins reported that naturally occurring mosaics on almonds, apricots, prunes and plums are transmissible to peaches and produce symptoms indistinguishable from peach mosaic.

Papers on the history of the citrus scab organism, *Elsinoe fawcetti,* by Anna E. Jenkins and A. Bitancourt, and the description of two species of Omphalia which cause decline disease in date palms by D. E. Bliss were of special mycological interest. Papers on soil-borne plant pathogens included the following subjects: a description of a vascular rhizoctoniosis of sugar beet and a Phytophthora rot of cucumber fruits, by W. A. Kreutzer; a discussion of the increase and spread of *Ophiobolus graminis* and the effect of climatic conditions on its prevalence, by Hurley Fellows; the control of Phymatotrichum root rot by the use of ammonium sulfate, by R. B. Streets; and the mechanical analysis of soil samples to determine the presence of relative infestation of *Sclerotium rolfsii,* by L. D. Leach. The development of a tomato resistant to both Fusarium and Verticillium wilts was reported by M. Shapovalov and J. W. Leslie, and P. A. Young discussed the relative susceptibility of tomato varieties to Fusarium wilt under East Texas conditions. The effect of psyllid yellows on the fluctuation of carbohydrates and nitrate nitrogen was reported by J. R. Eyer. A virus disease of cabbage, designated as black ring, was described by C. M. Tompkins. At the joint session of the Botanical Sciences, J. T. Barrett presented a paper entitled "Studies on Some of the Lower Forms of Parasitic Phycomycetes."

C. W. Bennett was elected president and B. F. Dana was elected vice-president of the Pacific Division of the American Phytopathological Society.

On Friday plant pathologists and their families were guests of the Upper Mississippi Valley Group on a tour which included a visit to the experiment station of the U. S. Department of Agriculture at Greeley and to the campus of Colorado State College at Fort Collins, where problems in the construction of dams were demonstrated by means of models in the Irrigation Hydraulics Laboratories.

A considerable number of visitors completed the tour through Rocky Mountain National Park with stops at Estes Park and Grand Lake. At the former location, C. A. Lory presented an interesting discussion on "Water Resources and Irrigation Problems in Colorado." Moving pictures of plants and animals in the park were also shown.

Members of the American Society of Plant Physiologists attending the Denver meeting enjoyed a full program, including one joint session with three symposia and two general sessions. In addition, there was a dinner on Tuesday evening for plant hormone physiologists, a biologists' dinner on Wednesday evening, a dinner and smoker for plant physiologists on Thursday evening, and field trips and excursions on Friday afternoon and Saturday.

On Tuesday morning the program centered on chlorosis and some of the minor chemical elements. Papers were presented by J. P. Bennett and V. W. Smart on the results of water culture studies; by C. P. Sideris and Edmund Burke on studies of chlorosia of pineapple and fruit trees; and by Frank M. Eaton on problems arising from both excessive and deficient boron in the culture media of plants.

The plant hormone symposium, consisting of four papers, was held on Tuesday afternoon, F. W. Went presiding. A more detailed discussion of theories and methods pertaining to the subject followed the Tuesday evening dinner.

On Thursday morning a symposium was held on drought resistance in plants, A. H. Hendrickson presiding. This subject drew a large audience and the papers were extremely interesting. Chemical aspects of the problem were considered by W. E. Tottingham and H. F. Clements. Drought resistance in relation to soil moisture was discussed by A. H. Hendrickson and F. J. Veihmeyer and by H. L. Shantz. The adaptability of certain crops, particularly sorghums, to drought was discussed by H. H. Finnell. J. R. Furr described some critical experiments designed to show the relative availability of water just above the wilting range.

After the dinner, J. P. Bennett, toastmaster for the evening, introduced R. B. Harvey, who spoke on fruit processing, and George R. Hill, who spoke on effects of sulfur dioxide on plant growth.

The general session on Friday morning was devoted to a group of notably fine short papers. From the standpoint of plant physiology, this summer meeting at Denver was characterized by the high quality of papers presented and the fine attendance at all sessions.

New officers announced for the ensuing year at the plant physiologist dinner on Thursday evening were as follows: American Society of Plant Physiologists: *President,* O. F. Curtis, Cornell University; *Vice-President,* W. F. Loehwing, University of Iowa; *Secretary-Treasurer,* F. P. Cullinan, U. S. Department of Agriculture; *Executive Committee,* R. B. Harvey, University of Minnesota; *Editorial Board,* H. R. Kraybill, Purdue University. Officers for the Western Division of the above society for 1937–38 are: *Chairman,* H. F. Clements, Washington State College; *Vice-*

Chairman, F. M. Eaton, Rubidoux Laboratory, Riverside, Calif.; *Secretary,* A. S. Crafts, University of California.

The Pacific Section of the Botanical Society of America held two sessions, the second of which was a symposium on "Genetics and the Species Problem." Lincoln Constance presented evidence from his own collections for revising the genus Douglasia. James B. McNair showed that the physical and chemical characteristics of the glycerides of plants present characteristic differences from species to species which indicate an evolutionary sequence, and therefore that the glycerides and probably other chemical compounds found in plants can be used as an aid in making a more accurate classification of plants. E. B. Babcock, discussing the question of whether gene mutation is the only method of evolution, concluded from studies of the genus Crepis that it is only one of three or more types of change, all of which have occurred in this genus. His second paper discussed the relatively new term "autogonamatic species," citing examples of the occurrence of this type of change in the genus Crepis. L. L. Burlingame presented a large amount of data to show that four of the five gene pairs which condition flower color in *Clarkia elegans* behave in a perfectly normal manner when derived from particular pure lines. It was also shown that these genes offer valid evidence of fixed linkages in spite of the fact that cytological preparations have not so far demonstrated any chromosome individuality. From this it was concluded that they must occupy the same relative position in the gene chain in spite of the possible lack of the usual chromosome individuality.

The afternoon symposium consisted of two papers and discussion from the floor. E. B. Babcock's paper reviewed his extensive work with Crepis. He showed that the various species of the genus do actually differ; (1) in respect to the particular alleles present at common loci; (2) in the number of chromosomes present, and (3) in the shape and size of the individual chromosomes of certain species. He argued that such differences could have arisen through (1) gene mutation and (2) addition of chromosomes by hybridization and/or irregularities of mitosis or meiosis. The discussion of this paper was opened by Roy E. Clausen, who was in general agreement with the paper but inclined to shift the emphasis of the speaker in respect to certain parts of the evidence. Sterling Emerson reviewed not only his own work with Oenothera but that of many other workers. He showed very convincingly that internal alterations of gene arrangement in the chromosomes is a wide-spread phenomenon in Oenothera species and that genic change is less conspicuous than in most known genera. He showed how the translocated sections of chromosomes arising through segmental interchange can be identified and how this enables one to understand the cytogenetic behavior of the natural species as well as to predict that of previously unknown hybrids. The discussion was ably opened by Dr. Catcheside, of London, who appeared to be in general agreement with the Oenothera students and indicated that this method of evolutionary change may well prove to be important over a wider range of plants than has hitherto been generally supposed.

At the brief business meeting A. H. Haupt, of the University of California at Los Angeles, was chosen president, and Lincoln Constance secretary-treasurer for the coming year. It was decided to hold a meeting in San Diego next spring in conjunction with the Pacific Division of the association.

PROGRAMS RELATED TO BOTH ZOOLOGICAL AND BOTANICAL SCIENCES (F AND G)

(*Reports from H. de Forest and M. W. Johnson*)

The program of the Ecological Society of America began on Tuesday with an all-day field trip to Mount Evans. Because of the late snows an altitude of only about 12,000 feet could be attained. The plant and animal life of the foothills, montane belt and alpine zone were interestingly described by C. W. Penland, R. J. Niedrach and Walter Kiener, while M. F. Boos discussed the geologic features.

The indoor sessions began on Wednesday morning with a symposium by four invited speakers on "Conservation Management of Wildlife." H. L. Shantz spoke on "Wildlife Management in the National Forests," discussing the general situation, the status of certain animal species, and what is now being accomplished. John W. Scott considered the general principles of wildlife management, its present condition, plans that have been proposed and the situation in Wyoming. Edward D. Crabb presented some exceedingly interesting facts on wildlife management and dealt with its status in Colorado. A. M. Woodbury presented the management of aquatic wildlife in the Great Basin, dealing with the water and drainage conditions of the area and its several problems in the management of fish, waterfowl, aquatic furbearers, mosquitoes and related questions.

On Thursday morning the society held two sessions for the presentation of papers, one on botanical subjects, with H. de Forest presiding, and the other on zoological subjects, with Edward D. Crabb presiding. At the session for the presentation of botanical papers, George B. Rigg reported on his latest investigations on bogs, and Constance Hartt gave an interesting account of the vegetation of one of the Hawaiian Islands. These discussions were followed by a sequence of papers on Colorado plant life. After a general

introduction of the plant geography and climate of the state by Francis Ramaley, Walter Kiener gave an account of some aspects of the alpine vegetation of the Rockies, with a consideration of the timberline; A. E. Holch recounted a series of experimental investigations by himself and some of his associates on the root habits of certain plants of Rocky Mountain National Park, relating to the survival of alpine species; and Harriet Barclay gave a detailed account of the vegetational history of a mountain meadow near Gothic, Colorado. This sequence of papers was followed by a study of the development of the vegetation of vernal pools, by Edith Purer; a mathematical consideration of the relative accuracy of the phytometer method, by E. V. Martin; a comparison of a California watershed which has suffered erosion through human activities with a similar watershed in Baja California, which has been without such erosion, by R. S. La Motte; and a paper recounting the results of measurements of surface soil and air temperatures in a desert, by W. V. Turnage.

In the session for the presentation of zoological papers, a valuable discussion followed the presentation of a brief report by A. O. Weese, of the society's Committee for the Preservation of Natural Conditions, in which H. H. Chapman presented some important views. Gordon Alexander discussed altitude in relation to the distribution of grasshoppers in Colorado. E. D. Ball gave extemporaneously an account of the leafhopper factor in the carrying capacity of the range. Maurice T. James presented a paper on the relationship of some robber-flies to biotic communities in Colorado. John T. Emlen read a very interesting paper on the American crow. Charles T. Vorhies discussed the interrelationships of range animals. In general, the native animals were found beneficial to the range.

On Saturday and Sunday the society took a week-end field trip, arranged by Gordon Alexander, to Rocky Mountain National Park. The party remained Saturday night at Science Lodge of the University of Colorado in the mountains at about 9,500 feet altitude. E. L. Johnson and Hugo G. Rodeck explained the plant life of the areas visited and Gordon Alexander discussed the animal life. The party inspected alpine life along the Trail Ridge Road and some mountain meadows and lakes with montane forests of various types, including krumholtz at timberline.

The success of the society's field trips was due to the able management of A. E. Holch, chairman of the local committee of the society, assisted by Messrs. Gordon Alexander, David Costello and John W. Scott. The guidance of those thoroughly familiar with the region visited made the trip of unusual scientific interest.

Although the Western Society of Naturalists has very few members outside the three Pacific Coast states and British Columbia, it followed its usual policy of holding one of its semi-annual meetings with the Pacific Division of the association. Its program consisted of a joint session sponsored by the Section on Botanical Sciences (G) and a half-day session on Wednesday. A. R. Moore discussed the structure of protoplasm and gave data showing that the cytoplasm contains submicroscopic fibrils. From studies made of factors influencing the bilaterality of the eye rudiment in amphibia, Alton L. Alderman concluded that the mesoderm alone is responsible for the appearance of bilaterality. J. Field II and E. G. Tainter presented data on the weight and oxygen consumption of excised rabbit lens, the oxygen consumption being compared to that of other rabbit tissues. In discussing inheritance in the deer mouse, R. R. Huestis stated that three already described recessive mutations show no evidence of linkage. A new white, red-eyed mutant was also described. D. L. Fox stated that carotenoid pigments occur in filtered sea water as well as in muds from the sea bottom at considerable depths, these pigments presumably originating from plants living near the surface of the sea. In California considerable damage to almond crops is often caused by certain birds such as crows, California woodpeckers and flickers, according to data presented by John T. Emlen, Jr. George B. Rigg reported on studies of abnormalities in the form of bladder kelp, from which he concluded that such abnormalities are caused by physiological disturbances rather than by mechanical injury.

SECTION ON ANTHROPOLOGY (H)

(Report from F. H. Douglas)

Meetings of the Section on Anthropology (H) were held on Wednesday and Thursday in the Chappell House branch of the Denver Art Museum. Several papers made comparisons of southwestern archeology with that of neighboring regions. E. B. Sayles reported on the excavations of the Hohokam Snaketown site and discussed the indications of relationships of the Hohokam culture with that in the Basketmaker-Pueblo, Mogollon, Mexican and Lower Mississippi areas. Related in subject-matter was the full report by Forrest Clements on the archeology of Oklahoma and especially of the Spiro Mound, with its rich finds of material strongly suggestive of Mexico. Motion pictures, some in color, vividly presented this work. The little known field of northwestern Mexican archeology and its connection with the Southwest was outlined by Donald D. Brand. A further light on the ties between Mexico and the Mound-builders was given by F. Martin Brown and Georgia Minshall in a paper

on the sculptured panels in the Chichen Itza ball court. The suggestion was offered that the Mexican-like figures appearing on Mound-builder shell gorgets and copper plates might represent ball players, because of their close resemblance to Mexican carvings of such athletes. Two papers discussing comparison in another direction concluded this group.

H. P. Mera described certain conical bottomed pots from a thirteenth century site on the Gallina, in northern New Mexico, which suggest that Woodland pottery may be found to have extended into the Southwest. The discussion following the paper brought out the suggestion that Navaho, Apache and Piute pottery might also be in this class. The question of the Asiatic origin of Woodland pottery, now being so much discussed, was treated in a paper by Charles Mantz on the archeology of northern Japan.

Several papers were concerned with local archeological problems. W. S. Stallings, Jr., outlined the sequence of culture in the upper Rio Grande between the years 1100 and 1400. Tree ring study has made possible a clear picture of the evolution of house and artifact types in this area. Odd S. Halseth described new developments at the large Hohokam mound, near Phoenix. Especially interesting was the finding of house sites near the mound, which was itself used only for storage chambers. Byron Cummings reported on the latest work on the large ruin of Kinishba with which he has been occupied for six seasons. He outlined the plan of excavation by which part of the ruin will be restored, part excavated and part left as it is. The Winona culture, near Flagstaff, was described in a group of papers by Colton, McGregor and Hargrave. This culture appears to be a northern extension of the Hohokam, having well-developed ball courts and other southern characteristics.

In the field of eastern archeology, Fay-Cooper Cole described the workings of the McKern classificatory system of archeology in Illinois sites, and James B. Griffin presented a paper on a number of problems of eastern archeology in its relationship to historic tribes.

The problem of early man in America received attention in three papers. Marie Wormington and Betty Holmes gave a detailed presentation of the chipping techniques exhibited by Folsom and Yuma artifacts. E. B. Renaud described a chipped pebble industry in southern Wyoming which shows every stage from the simplest uniface chipping to complete biface forms. Charles Amsden devoted his discussion to the rather recently discovered very ancient culture found along the shores of Lake Mohave, one of the large dry lake basins of southern California.

A group of papers had to do with a number of almost untouched problems in the field of ethnology. Anne M. Cooke outlined the results of a season among the little known Northern Ute, making clear the strong preponderance of Basin culture in this group. Some of the points discovered in a survey of Pueblo embroidery were presented by F. H. Douglas, especial attention being paid to the possibility that certain of the more common design elements may be of Italian origin and transmitted through Spain. The most characteristic feature of Basketmaker culture, its basketry, was given a detailed analysis by Earl H. Morris. A phase of the pictorial art of the Southwest was presented by Kenneth Chapman in a paper illustrating the use of the human figure in pottery painting. Allied in subject, but concerned with a widely different aspect of it, was the report by Mitchell Wilder on the santos, or sacred pictures and carvings of the New Mexico Mexicans. A paper by Frances Densmore described certain striking similarities between the singing and the musical instruments of Indian and oriental groups.

Some additional light was thrown on the problem of early man in Minnesota by P. B. Candela in a paper on the blood groups found on bones from the Lake Pelican site; and by T. H. Evans in a discussion of the stapes ear bone from the same site. Gertrude S. Evans described the interesting remains found in a seventeenth century cemetery on Long Island.

On Friday some twenty members of the section visited the Lindenmeier Folsom site now being excavated by the Smithsonian Institution. Frank H. H. Roberts had prepared a field exhibit showing various stages of the work and specimens *in situ*.

SECTION ON PSYCHOLOGY (I)

(Report from T. R. Garth)

The Section on Psychology (I) assembled on Monday morning on the campus of the University of Denver.

The first meeting was a formal program, presided over by Thomas R. Garth. The topics ranged from "The Unlearned Food Reactions of Infants," by Thomas H. Howells, to "The Psychology of John Dewey," by Paul Crissman. Charles A. Rymer reported on the relationship between psychiatry and psychology, illustrated by a recent personal inspection of hospitals in Russia and Germany. The topic of personality was considered by two speakers. J. Heilman gave an account of "A Personal Data Sca which is proving itself useful in educational guidance and Edna D. Baxter described a child's personality test, devised and standardized by her. The subject of experimental esthetics was dealt with by Margaret St. George under the title, "A Study of the Color Preferences of College Students." Karl Muenzinger next morning gave an interesting account of a

methodology in statistics under the title of "The Degree of Indeterminacy of Primary Factors Indicated by the Correlation Matrix."

The next two sessions, presided over by Thomas R. Garth and Robert H. Bruce, consisted of papers on physiological psychology. L. W. Cole gave a very interesting summary of encephalometric results. George M. Peterson reported important findings on handedness with special reference to locus and mass as it is controlled by cerebral cortex in the rat. This was followed by two reports on animal learning, one by A. H. Bernstone, "Effect of Equated Punishment in Visual Discrimination," and one by Robert H. Bruce, "Variability of Performance with the Field Technique."

The second session, devoted to physiological psychology, all with lantern slides, ranged from "Color Vision of Rodents," especially with reference to experimental techniques, by W. E. Walton and R. W. Bornmeier, to two accounts of human physiological psychology, one by Edmund Jacobson, who reported results obtained by "An Instrument Affording Instant Reading of Nervous or Muscular States," and the other by Calvin P. Stone, who gave an account of "Differences in Attitudes and Interests of Post-Menarcheal and Pre-Menarcheal Girls of the Same Chronological Ages."

L. W. Cole was chairman of the program on Tuesday afternoon, which was devoted to five papers on race psychology. A paper by Leigh Peck noted experimental evidence of either racial or group differences in eidetic images among whites, Negroes and Mexican children; another paper was on "The Personality of Indians," by Thomas R. Garth and Thomas R. Garth, Jr., who administered the Allport A.S. Test to groups of full and mixed blood Indians and whites in high school, junior college and college. There were three interesting accounts of studies in racial differences in color preferences. The first of these was "The Color Preferences of Turks," by Jeanne Foote, reporting on one thousand cases; the second was on "The Color Preferences of 1,078 East Indians," by Corrine N. Anthony; and the third was on "The Color Preferences of 1,011 Koreans," by Lawrence Schuerman. This program was concluded by a scholarly paper on "Meaning as a Factor in Learning," by H. B. Reed.

The program of Wednesday morning was a combined session of the Section on Psychology and the Section on Education, Lawrence W. Miller presiding. Lillian Portenier reported on "A Twelve-Year Study of High School Pupils"; A. H. Wood and R. A. Davis reported on "Needed Research in Schoolroom Learning"; W. H. Thompson told of a study of "Characteristics of Written Compositions at Various Age Levels and Conditions of Deafness"; Granville Johnson gave an interesting account of an experiment in "Recreational Therapy" which is being carried out under his direction among psychopathic patients at the State Psychopathic Hospital of Colorado. The last paper of this session was by R. J. Triplett, who gave an interesting account of "The Interests and Aptitudes of Commercial Students."

The closing session, under the chairmanship of George T. Avery, consisted of "The Motor-Kinesthetic Method of Training Children with Delayed Speech," by Sara Stinchfield Hawk, and "A Case of Bilateral Central Scotoma Resulting from a Gun Shot Wound to the Occipital Cerebral Cortex," by H. R. Crosland. These papers were accompanied by moving pictures and lantern slides and occupied the whole of the afternoon session for Wednesday.

SECTION ON SOCIAL AND ECONOMIC SCIENCES (K)

(Reports from E. P. Hutchinson, Alfred Cowles, III, Frederick F. Stephan and Leroy Allen)

The Denver program of the Section on Social and Economic Sciences (K), featuring the participation of five affiliated and related societies—the American Statistical Association, the American Sociological Society, the Econometric Society, Pi Gamma Mu and the Sociological Research Association—was planned with the hope that the summer meetings of the association may provide effective contacts between the professional and learned societies and the social sciences.

The papers of the first session, organized by the American Statistical Association and with R. L. Cleere presiding, were concerned with health surveys and vital statistics. Halbert Dunn spoke on the residence allocation of births and deaths and on the administrative problems of securing reliable registration of vital statistics. G. St. J. Perrott discussed the health problems arising from the gradual aging of the population. Dorothy Wiehl summarized findings in studies of maternal health, a detailed report of which is to be made in a coming number of the *Milbank Memorial Fund Quarterly*.

Two simultaneous sessions were conducted on Thursday morning—one a joint session on mathematical economics with the Section on Mathematics (A) and the Econometric Society, C. F. Roos presiding; the other, that of the American Statistical Association on the organization and technique of national statistical surveys, at which Stuart A. Rice presided. (See the report of Section A.)

The second morning session was opened by Stuart A. Rice with an announcement of a relaxation of official restrictions on the use of house-to-house interviewing in connection with governmental research projects. The speakers then reported on the organization and administrative details of three national

surveys: F. L. Carmichael, on WPA studies of the reemployment of relief cases; G. St. J. Perrott, on the national health survey of the U. S. Public Health Service; and Forest R. Hall, on the field work of the urban study of consumer purchases being conducted by the Department of Labor Statistics.

Following these sessions, a very successful luncheon meeting was held with Pi Gamma Mu, at which Leroy Allen of the fraternity presided. Carl O. Sauer spoke on social science research on the Pacific Coast. Ben M. Cherrington then reviewed the status of social science research in the Rocky Mountain Region.

On Thursday afternoon a joint session with the Section on Mathematics (A), the Econometric Society and the American Statistical Association was devoted to the subject of mathematical statistics. E. V. Huntington presided. (See the report of Section A.)

The climax of the program was a brilliant address by Carl Snyder on "New Foundations for an Economic Science" at a general Thursday evening session of all the participating societies. In the introduction Stuart A. Rice spoke of the importance of increased efficiency in government and of the efforts for coordination being made by the Central Statistical Board.

The Friday morning session on "Economic Balance and Impacts" was under the auspices of the Econometric Society, with S. M. DuBrul presiding. C. F. Roos spoke on "Measuring Economic Impacts"; Carl Snyder on "Relation Between High Profits and High Wages"; and Louis Bean on "The Balance Between Agriculture and Industry."

At a second morning session with Heber R. Harper presiding, which was a joint session of the American Statistical Association, the American Sociological Society and the Sociological Research Association, Ewan Clague discussed statistical and economic problems in the administration of the Social Security Act. Following this discussion, A. D. H. Kaplan presented a report on fixed and variable expenditures in family budgets, based on data obtained in the U. S. Bureau of Labor Statistics' study of consumer purchases, and showing the relative expenditures for clothing, food, housing, etc., of families at different income levels and in different parts of the country.

The program ended with the Saturday morning session of the Econometric Society on inflation, Carl Snyder presiding. "The Course of Prices of Agricultural Commodities and their Outlook" was presented by E. J. Working. Jesse H. Bond read a paper on "A Consumptionstat: Its Necessity as an Inflation Control," a proposed method of dampening the fluctuations of the business cycle. James H. Rogers closed the session with a paper on some quantitative aspects of inflation. In this analysis of the possibilities for inflation as they now exist in the United States, he stated that the unbalanced Federal Budget presents the greatest threat to economic stability, but gave assurance that there is no threat of monetary inflation which can not be met by courageous action on the part of the Federal Reserve Board and the Treasury Department.

The first session of the Econometric Society, held jointly with the Section on Mathematics (A) and the Section on Social and Economic Sciences (K), included two papers on the uses of functionals in economics by Harold T. Davis and Gerhardt Tintner. Griffith C. Evans and Kenneth May followed with a paper on régimes of cooperation and competition. Then R. W. Shephard discussed the incidence of taxation in a simplified economic system.

At the second session, held jointly with the Section on Mathematics (A), the Section on Social and Economic Sciences (K) and the American Statistical Association, papers were presented by F. W. Dresch, Edward L. Dodd and Holbrook Working.

At the Friday morning session, held jointly with the American Sociological Society, the Sociological Research Association and the Section on Social and Economic Sciences (K), papers were presented by Charles F. Roos, Carl Snyder and Louis H. Bean. The last gave an interesting exposition of the balance between agriculture and industry, reviewing the changing relations between the two over the past one hundred years.

SECTION ON ENGINEERING (M)

(Reports from Dana E. Kepner and Lester D. Gardner)

The program for the Section on Engineering (M) was arranged by the Colorado Engineering Council, cooperating with the local section of the Society of American Foresters and with the Hydrology Section of the American Geophysical Union.

The general subject of the program was transmountain diversion of water. D. D. Gross, chief engineer, Board of Water Commissioners, of Denver, Colorado, reported on "The Denver Municipal Water System and the Moffat Water Tunnel Diversion Project." This paper was accompanied by motion pictures showing practically all features of the Denver Municipal Water System. The other paper, by Mills E. Bunger, engineer, U. S. Bureau of Reclamation, was on the "Engineering and Economic Features of the Colorado-Big Thompson Diversion Project." The paper was illustrated by lantern slides, as well as by the display of a relief map of the territory in which this project lies. The speaker emphasized the fact that no visible part of this project would be located within the Rocky Mountain National Park.

For the balance of the week, members of the Engi-

neering Section attended sessions of the Society of American Foresters and of the Hydrology Section of the American Geophysical Union, at which such interesting related subjects as treating forestation of watersheds and run-off data were considered. (See report of Section B.)

The Subsection on Aeronautics of the association was represented by the program of the Institute of the Aeronautical Sciences on Tuesday afternoon, Clark B. Millikan presiding. Jean Piccard read a paper on "Composite Balloon *versus* Single Balloon." H. M. Hucke presented a paper on "The Elimination of Snow and Rain Static in Flying Operations." W. R. Gregg gave a paper on "Application of the Polar Front Theory to Practical Meteorological Forecasting." Fred D. Fagg, Jr., spoke on the "Federal Control of Air Traffic." Fowler W. Barker presented a paper on "Contributions of Science to Air Transport."

SECTION ON MEDICAL SCIENCES (N)

(Reports from Malcolm H. Soule, John C. Krantz, Jr., G. H. Ball and J. Field)

The meetings of the Section on Medical Sciences (N) were devoted to a symposium on "Diseases Caused by Acid-Fast Bacilli," with the exception of a joint session with the Pacific Coast Branch and Southern California Branch of the Society of Experimental Biology and Medicine and a joint session on Monday afternoon with the Subsection on Pharmacy.

The symposium consisted of three sessions extending from 10 to 12:30 on Tuesday, Wednesday and Thursday, with a total of eighteen papers by outstanding workers in this field. On the Tuesday program the common bacterial, chemical and pathological characteristics of the diseases were considered. The meeting was opened by Esmond R. Long. Morton C. Kahn followed with a consideration of the morphological characteristics of the tubercle bacillus, particularly the method of reproduction as revealed by the study of stained vertical sections of the human and bovine bacillus colonies. A brief review of chemical studies on the tubercle bacillus and other acid-fast bacilli by R. J. Anderson, Michael Heidelberger and A. E. O. Menzel, and Florence B. Seibert, carried out in cooperation with the Medical Research Committee of the National Tuberculosis Association, formed the subject of the third report.

Immunity to tuberculosis has been the subject of extensive investigation, for it is well known that certain patients develop a resistance to the causative agent of this disease. Max B. Lurie gave a comprehensive review of the natural resistance of various species to tuberculosis and then outlined his experiments, which demonstrated that acquired immunity is somewhat analogous. Florence Sabin then took up the pathology of tuberculosis, limiting her remarks to two types of tubercles, the "hard" and "soft" tubercles of miliary tuberculosis. In closing the first session of the symposium, Harry J. Corper brought up the very pertinent question which is still unsolved: Why do the various strains of pathogenic tubercle bacilli, human, bovine and avian, vary strikingly in pathogenicity for the different animal species?

The program on Wednesday was devoted to tuberculosis and other animal diseases of acid-fast origin. Geo. W. Stiles, Jr., opened the session with an extensive review of the data pertaining to tuberculosis as it affects our common barnyard herds and flocks. The three subsequent papers by William H. Feldman, A. B. Crawford and Lyman L. Daines considered in detail the tuberculin reaction. An excellent résumé of tuberculosis of cold-blooded animals by Joseph D. Aronson was followed by a comprehensive review of Johne's disease by William A. Hagan.

The concluding session of the symposium was devoted to leprosy. George W. McCoy and James A. Doull considered the epidemiology of this age-old disease. After discussing the many unsolved problems of leprosy, they concluded that isolation of lepers in the United States is not necessary. Ralph Hopkins presented evidence of a heredity tendency to leprosy, and maintained on this basis alone that segregation of lepers is justified. H. E. Hasseltine pointed out that institutional segregation of leprosy in some form is almost as old as leprosy itself, and he urged the education of people regarding the nature of the disease. The bacteriology and immunology of leprosy was reviewed by M. H. Soule, H. J. Henderson and E. B. McKinley. The entire leprosy problem was summed up by Perry Burgess.

The Friday session opened with a memorial address by F. G. Novy, commemorating the life and work of Henry Sewall. Novy, first a student and then a teacher of Sewall, brought to his audience an intimate picture of Sewall's early accomplishments and the conditions under which he was forced to carry out his great pioneer experiments in physiology and immunology. Following this memorial session, over which E. G. Conklin presided, six papers were presented by individuals from the Denver area, dealing particularly with pulmonary infections. Frank B. Queen presented a case of pulmonary moniliasis and George Foster, Jr., reported on *Torula histolytica* infections.

The Subsection on Pharmacy held two sessions, one on Monday morning and the other on Monday afternoon, the latter jointly with the Section on Medical Sciences and the Pacific Coast Branch and Southern California Branch of the Society of Experimental Biology and Medicine. The morning program opened with a paper by Fred E. D'Amour on the assay of the

commercial endocrine products. Justus C. Ward and Jack F. Welch reported further work on the toxicity of strychnine. An interesting outcome of these studies was the observation that female rats are more susceptible to the poison than the males. Another paper on strychnine by Arno Viehoever discussed the use of the transparent test object *Daphnia* as a means of indicating the physiological uniformity of this alkaloid. A comparison was made by G. F. Reddish of tests recommended for the evaluation of the antiseptic activity of lozenges, the results under controlled conditions varying within wide limits. A paper on the subject of the inhibition of microbic growth was given by D. A. Joslyn. He demonstrated how bichloride of mercury exhibits its maximum activity against *Staphylococcus aureus* in the presence of an excess of acid, a fact in keeping with records made nearly fifty years ago. John C. Krantz, Jr., showed that the germ *Acetobacter suboxydans* attacked the secondary alcohol group in glycerol specifically and oxidized it quantitatively to dihydroxyacetone. A new qualitative test for the nitro group in organic compounds depending upon the oxidation of ferrous to ferric hydroxide was reported by Montgomery Hearon and R. G. Gustavson. The morning session closed with papers by Norman F. Witt, who described a series of physical constants that may be employed to identify salts of cocaine, and C. F. Poe, who discussed a modified method of assay for spirits of camphor.

The Pacific Coast and the Southern California Sections of the Society for Experimental Biology and Medicine held a joint session with Section N on Monday morning. Eleven papers were presented, covering a variety of subjects. In a series of experiments reported by O. L. Huddleston the fluid intake of pigeons was restricted to a 5 per cent. solution of alcohol. Over a period of twenty months frequent testing did not detect functionable abnormality of the complicated reflex arcs concerned with head-nystagmus. Richard H. Barnes reported that rats stuff themselves and grow fat when they are given daily doses of protamine insulin, but do not grow fat when given ordinary insulin. Charles A. Rymer reported on behalf of himself, John D. Benjamin and F. G. Ebaugh that of ten cases of schizophrenia treated by the new insulin shock method five had complete remissions and three more showed great improvement. Three papers dealing with the establishment of standards for young children are a part of the studies being carried out by the Child Research Council. R. M. Hill reported on the plasma protein levels in normal infants and children; Mason Light on the bone marrow volume of the new-born; and J. A. Anderson gave the results of the effect of prolonged standing on pulse and blood pressure in boys.

The afternoon session, at which nine papers were presented, was held jointly with the Subsection on Pharmacy. The activities of microbes formed the subject of several of the reports. O. S. Kretschmer has repeatedly isolated streptococci of the non-hemolytic variety from areas of calcification of the pulp of teeth. Severance Burrage, under the title "A Health Doctor's Odd Ways," stressed the importance of avoiding the handling of dishes and demonstrated plates of bacterial mediums that he had "fingerprinted." Edward Jackson reported on the physiology of equilibrium, stating that the internal ear was originally an organ to recognize the direction of gravitation, but that in man vision is the most important guide to equilibrium. This session closed with a paper by Robert H. Wilson on the search for organic substitutes for inorganic insecticides.

SECTION ON AGRICULTURE (O)

(Reports from M. F. Morgan, S. C. Vandecaveye and Henry Clepper)

The sessions of the Section on Agriculture (O) featured various factors of the agricultural development of the Rocky Mountain Region, especially as related to utilization of available irrigation water. . W. Kubiena, guest speaker from the Hochschule für Bodenkultur, Vienna, Austria, described the employment of his methods for microscopic examination of the soil, both in mass and in thin sections.

The Western Society of Soil Science held three half-day sessions, two of them on the campus of the Colorado State College and the third in Denver, in addition to a joint session with the Western Section of the American Society of Plant Physiologists. The attendance ranged from forty-five to ninety-five persons.

The papers presented at the opening session related to soil and water conservation and soil humus, including studies carried on at the Intermountain Forest and Range Experiment Station and laboratory and greenhouse studies at the Wyoming Agricultural Experiment Station. In addition, results of studies on the transformation of organic matter in the soil were reported from the Riverside Citrus Experiment Station of the University of California and from the State College of Washington.

In the second session, papers were presented on nutrient ratios, soil zinc, soil arsenate and soil microbiology. Studies at the State College of Washington dealing with nutrient ratios in plant growth and arsenate solubility were presented. The studies on soil zinc at the University of California were reported to be in relation to various plant diseases. As a result of studies at the State College of Washington on the microbial activity in soils, a definite sequence in the

activity of various important groups of soil microbes as well as a microbial climax in the soil flora was suggested. Work on nitrification reported from the Intermountain Forest and Range Experiment Station showed that the numbers of Nitrosomonas in the soil increased as a result of certain soil treatments. A report was given of studies conducted at the Colorado State College on non-symbiotic fixation of nitrogen in Colorado soils.

In the closing session, papers dealing with the physical characteristics of the soil and soil alkali were presented, including soil surveys conducted by the University of California in desert regions and a report of experiments carried on over a period of years at the Riverside Citrus Experiment Station on the problem of economical reclamation of alkali lands. The results of studies by the Colorado State College on soil from slick spots and on the effect of salts and dilution on soil reaction were reported.

The following officers were elected for the ensuing year: *President,* S. C. Vandecaveye, State College of Washington, Pullman; *Vice-President,* H. D. Chapman, Citrus Experiment Station, University of California, Riverside; *Secretary-Treasurer,* J. C. Martin, University of California, Berkeley.

A successful first summer meeting of the Society of American Foresters was held jointly with the association. Although not large, the attendance of foresters was representative. Members were present from the Allegheny, Appalachian, California, Central Rocky Mountain, Intermountain, Minnesota, New England, Washington and Wisconsin Sections. A notable feature of the sessions was the wide variety of topics discussed under the various programs and general sessions. Among the subjects available were those in botanical, zoological, social and economic sciences. Of particular interest to many of the foresters were the excellent symposia presented by the engineering and agriculture sections, particularly those having to do with watershed management, soil conservation and flood control.

At the dinner held on Tuesday evening forty-seven were present, R. E. McArdle, chairman of the Central Rocky Mountain Section, acting as toastmaster. Among those contributing brief remarks were C. F. Korstian, Walter C. Lowdermilk, E. P. Meinecke, Joseph Kittredge, W. J. Morrill, Henry Schmitz, A. S. Peck and President H. H. Chapman.

On Wednesday a scheduled trip was made to the Pike National Forest to inspect thinning and utilization operations, reforestation projects and the Manitou Forest Experiment sub-station. Field trips were continued on Thursday and Friday for those wishing to study soil conservation projects and research projects and to visit the Northern Rocky Mountain National Park.

The officers and members of the Central Rocky Mountain Section acted as hosts with typical western hospitality. Nothing was left undone to contribute to the instruction and enjoyment of those in attendance.

ORGANIZATIONS RELATED TO THE ASSOCIATION AS A WHOLE

(*Report from Frank E. E. Germann*)

The American Association of University Professors met on Tuesday afternoon for the first regional meeting for Colorado, New Mexico, Utah and Wyoming. In competition with sectional meetings, several symposia and field trips, the attendance of about 100 was very gratifying and a real tribute to A. J. Carlson, president, who had made the trip to Denver especially to talk on the subject, "Some Common Problems before the American Colleges and the College Professors." Dr. Carlson made a vigorous attack on the present-day tendency of college administrators gradually to take over the control of universities in the matter of appointments and promotions without considering how this policy affects the general morale of the faculties.

Orin Tugman read a paper on "A Teacher Looks at Teaching," in which he examined the reasons why we choose to teach, developing the idea that teaching is concerned with the question of human relations, a field in which more science should be applied. Discussion was led by L. J. Davidson and William R. Arthur.

SCIENTIFIC EVENTS

THE SOUTH PACIFIC EXPEDITION OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

THE schooner *Cressida,* bearing members of the George Vanderbilt Expedition to the South Pacific for The Academy of Natural Sciences of Philadelphia, returned to New York on July 18 with more than 20,000 natural history specimens of fish, reptiles, birds, mammals and plants.

Though it is difficult to estimate the results of the expedition at this time, it is expected that such a large collection from a portion of the Pacific which has been seldom visited by collectors will contain material of great scientific value. Special interest is centered in the fishes brought back, as one of the expedition's primary objectives was the assembling of a complete series of marlin, so that studies may be made of its distribution and breeding habits. It is hoped that

subsequent laboratory work will show a sequence of small fish in the collection that will range from about three quarters of an inch to one more than four feet in length.

Mr. Vanderbilt was accompanied on the expedition by Mrs. Vanderbilt and by Mr. and Mrs. Samuel Jones, of New York. Ronald W. Smith, of the academy, was in charge of collections, with Captain Bill Gray, of Palm Beach, who supervised the gathering of the marlin.

The *Cressida* left New York on January 13 and cleared the Panama Canal on February 1. Collections were made at the Pearl Islands, the seldom visited Malpelo Island and several islands of the Galapagos group. The next leg took the expedition on its long stretch across to the Marquesas, south to the Tuamotus and then to the Society Islands and Tahiti, reaching there during the second week in April. The *Cressida* then headed north, collecting at Tongareva, crossing the equator above Jarvis Island and stopping at other of the Line Island Group, Christmas, Fanning and Palmyra, on the way to Honolulu.

At the Hawaiian Islands, Mr. Vanderbilt pursued individual collecting work for fishes and sent the *Cressida* back to New York with its specimens for the academy.

REDUCED LEGISLATIVE APPROPRIATIONS FOR THE UNIVERSITY OF CALIFORNIA

THE request recently made to Governor Merriam by the regents of the University of California for a partial restoration of the budget of six years ago was denied, but when the facts were presented to the State Legislature a special appropriation of $1,456,000 was unanimously approved to bring the resources of the university to the minimum amount needed to meet the demands being made upon it. Governor Merriam withheld approval of this appropriation until the last day of grace, July 2, and then cut it by $455,000. As a result various curtailments in the work of the university have been made necessary.

In the great majority of cases it will be necessary to decrease the departmental budgets for equipment and routine expenses despite the fact that all are now embarrassed by four years of depression economy. The College of Chemistry and the College of Engineering have been compelled to seek gifts of equipment from many sources in order to maintain minimum teaching schedules.

Economies decided on include abandonment for the present of a longstanding problem of land utilization and range management on the foothills of the Sierra, intimately related to the general agricultural welfare of the state and strongly recommended by the California Agricultural Council; postponement of the request of the California Agricultural Council that more intensive efforts be made to solve problems of insect pest control in the state's specialty nut, fruit and vegetable crops; curtailment of facilities for emergency studies of agricultural problems; and discontinuance of the annual agricultural crop outlook survey for the State of California after twelve years of developmental work, necessitated by financial inability to hold competent men in competition with other agencies. In the past three or four years the Agricultural Extension Service has lost six men, leaving only one economist on the staff. All told, thirteen key men in the College of Agriculture have left within the past several months because the deficient budget of the university was unable to hold them in the face of better offers from other points.

In the Medical School further postponement of the program of book purchases to overcome neglect of the last four years in the library will be necessary. This step is taken with regret, as the library has never been as complete as it should be, and due to the depression conditions of the last two bienniums it has slipped further behind in the acquisition of needed literature. It is also necessary to curtail the plan to develop a staff of trained men to cope with the rising tide of nervous and mental disorders.

In general, throughout the university, wherever possible, the replacement of staff resignations and retirements will be postponed and the policy of seeking the best men available for teaching posts must be curtailed in spite of the circumstance that nine of the most eminent professors have retired this year. No new programs of instruction, however important they may be, will be attempted.

THE NATIONAL CANCER INSTITUTE

A BILL providing for a National Cancer Institute as a division of the United States Public Health Service has been signed by the President. An article on the establishment of the institute in the *Journal* of the American Medical Association gives the following particulars in regard to the organization.

The bill creates a National Cancer Advisory Council and enlarges the functions and resources of the Public Health Service with respect to the study and treatment of cancer. To house the proposed institute, the Secretary of the Treasury is empowered to acquire suitable land in or near the District of Columbia, and the appropriation of $750,000 for the erection and equipment of buildings is authorized. An annual appropriation of $700,000 is authorized for maintenance and operation. The Secretary of the Treasury is authorized also to accept gifts and bequests to further the work of the institute. These will not replace but will supplement the appropriations for the study of cancer of the Public Health Service and other agencies. Responsibility for conducting the institute

is divided between the National Advisory Cancer Council, the Surgeon General of the Public Health Service and the Secretary of the Treasury.

The National Advisory Cancer Council will consist of the Surgeon General, *ex officio,* as chairman, and six members appointed by him with the approval of the Secretary of the Treasury from leading medical and scientific authorities. Each member is to be paid for his services at the rate of $25 a day. The council will recommend to the Surgeon General programs relating to the cause, prevention, diagnosis and treatment of cancer considered worthy of such action; it will collect and will make available the results of investigations, and it will examine applications for grants-in-aid for research projects.

The Surgeon General is authorized to provide free facilities for training and instruction concerning cancer; to establish research fellowships for investigators from any part of the world and for the assistance of experts from the United States or elsewhere; for the appointment of commissioned officers in the Public Health Service to aid in carrying out the provisions of the act; for the purchase of radium, and for making it available for the purposes of the act, and for grants-in-aid to universities, hospitals, laboratories and other institutions, or to individuals, for research projects relating to cancer.

The Secretary of the Treasury is authorized to accept any unconditional gifts or bequests to be used for furthering the purposes of the act and to accept any conditional gifts for that purpose if acceptance is recommended by the Surgeon General and the council.

The act becomes effective thirty days after its approval by the President, but in accordance with congressional practice it carries no appropriation and may have to wait until an appropriation is made before it becomes operative.

In SCIENCE for July 2 there is given an account of the establishment at Yale University of the Jane Coffin Childs Memorial Fund for Medical Research. The resources of the foundation, said to be in the neighborhood of $10,000,000, will be devoted primarily to research into the causes and origins of cancer. It is provided that when in the judgment of the board of managers the causes and origins of the disease had been sufficiently determined, the fund "may thereafter on the advice of the board of scientific advisers" be devoted to research into "some other unsolved problems of medicine" or of "some other field of science."

RECENT DEATHS AND MEMORIALS

DR. VERNON LYMAN KELLOGG, permanent secretary of the National Research Council from 1920 until his retirement as secretary emeritus in 1932, previously professor of entomology at Stanford University, died on August 8 at the age of sixty-nine years.

WILLIAM ATKINSON JOHNSTON, professor emeritus of theoretical and applied mechanics at the Massachusetts Institute of Technology, died on August 6 at the age of sixty-eight years.

DR. JOSEPH LEGGETT MILLER, clinical professor of medicine at the Medical School of the University of Chicago, died on August 6. He was sixty-nine years old.

DR. FERDINAND CANNING SCOTT SCHILLER, professor of philosophy at the University of California and fellow of Corpus Christi College, Oxford, died on August 6 at the age of seventy-three years.

DR. AMOS WILLIAM BUTLER, formerly secretary and executive officer of the Board of State Charities of Indiana, died on August 5 at the age of seventy-six years.

THE death in his eighty-seventh year is announced of Dr. E. B. Elliott, from 1892 until his retirement in 1921 as emeritus professor Waynflete professor of mathematics at the University of Oxford.

THE west unit of the University of Kentucky College of Engineering group, the building of which is now under construction, will be named Anderson Hall, in memory of the late F. Paul Anderson, who was dean of the college for forty-three years. The building housing the departments of civil engineering and physics will be named Pence Hall, in honor of Dr. M. L. Pence, professor emeritus of physics.

AT Cheltenham College on Speech Day, July 3, Lord Willingdon unveiled a memorial tablet to Dr. E. A. Wilson on a wall of the new science laboratory. This bears the inscription: "Edward Adrian Wilson, M.B., biologist and explorer from boyhood a lover of Nature. He died with Scott on the return from the South Pole, March, 1912. Strong in will to strive, to seek, to find, and not to yield."

SCIENTIFIC NOTES AND NEWS

DR. GEORGE D. BIRKHOFF, Perkins professor of mathematics and dean of the Faculty of Arts and Sciences of Harvard University, president of the American Association for the Advancement of Science, and Dr. F. R. Moulton, permanent secretary of the American Association, have been appointed delegates from the association to the meeting of the British Association for the Advancement of Science to be held at Nottingham from September 1 to 8.

THE Comstock prize of the National Academy of

Sciences will be presented to Dr. Ernest O. Lawrence, professor of physics at the University of California, at the meeting of the academy to be held in Rochester from October 25 to 28.

M. P. MONTEL has been elected a member in the Section of Mathematics of the Academy of Sciences, Paris, to succeed the late M. E. Goursat; in the Section of Botany M. Henri Colin has been elected to succeed the late M. Mangon.

THE Halle Academy of Sciences has awarded Cothenius medals to Dr. Franz Volhard, professor of internal medicine at Frankfurt; to Dr. Eugen Fischer, professor of anthropology at Berlin; to Dr. Max LeBlanc, professor of physical chemistry at Leipzig; to Dr. Armin Tschermak-Seysenegg, professor of physiology at the German University at Prague.

PROFESSOR JULES BORDET, director of the Pasteur Institute of Brussels, has been awarded the Grand Cross of the Order of Leopold.

DR. J. MCKEEN CATTELL, editor of SCIENCE since 1895, formerly professor of psychology at the University of Pennsylvania and at Columbia University, has been made commander of the Legion of Honor by the French Government.

A TESTIMONIAL dinner in honor of Dr. Irvin Abell, Louisville, president-elect of the American Medical Association, was given on July 1 by the Jefferson County Medical Society. The speakers included Drs. William Barnett Owen, Louisville, president of the county society; J. D. Northcutt, Covington, president of the state association, and William D. Haggard, Nashville, Tenn., a former president of the American Medical Association.

THE Trustees Medal of the School of Civil Engineering of Cornell University has been awarded to Charles Smith Whitney. The award, given annually to a graduate for a paper tending to advance the interests of the profession, was made in recognition of a design of reinforced concrete under flexure published in the *Journal* of the American Concrete Institute.

DR. THADDEUS L. BOLTON, who has been head of the department of psychology of Temple University for twenty years, will retire this month at the close of the summer school. He will be given the title of professor emeritus and will hold only nominal connection with the department in the future. The department has increased during these twenty years from a registration of about forty to as many as thirteen hundred and fifty students with a teaching staff of seven full-time members.

DR. G. W. BEADLE, assistant professor of zoology at Harvard University, has been appointed professor of genetics at Stanford University.

DR. LAURENCE IRVING, professor of experimental biology at the University of Toronto, has been appointed professor and head of the department of biology at Swarthmore College.

WILLIAM REUEL CHEDSEY, head of the department of mining at the Pennsylvania State College, has been appointed director of the School of Mines and Metallurgy at Rolla, Mo., to succeed Dr. Charles H. Fulton, who has resigned after serving for sixteen years.

DR. LLOYD LOGAN, associate professor of gas engineering at the Johns Hopkins University, has been appointed professor of chemical engineering and head of the department at Syracuse University. He succeeds Dr. Albert Salathe, who resigned last spring.

DR. ALAN MORITZ, who has been pathologist in charge at the University Hospitals, Cleveland, since 1930, and associate professor of pathology at Western Reserve University since 1932, will join the staff of the Harvard Medical School as professor of legal medicine. He will succeed Dr. George B. Magrath, who will become professor emeritus.

DR. ARTHUR H. SMITH, associate professor of physiological chemistry at Yale University, has been appointed head of the department of physiological chemistry at the College of Medicine of Wayne University at Denver.

DR. GERHARDT TINTNER, of the Cowles Institute, has been appointed assistant professor of mathematics and economics at the Iowa State College. As a Rockefeller fellow, Dr. Tintner has worked at the London School of Economics and at various American universities.

DR. D. G. CATCHESIDE, lecturer in botany at King's College, University of London, who has held a Rockefeller research fellowship during the past year at the California Institute of Technology, Pasadena, has been appointed university lecturer in botany at Cambridge.

DR. J. H. SCHULMAN, of Trinity Hall, has been appointed assistant director of research in colloid science at the University of Cambridge.

DR. EDWARD H. GRAHAM, formerly assistant curator of botany at the Carnegie Museum, Pittsburgh, has become biologist in the Section of Wildlife Management of the Soil Conservation Service, Washington, D. C.

DR. HAROLD W. HOOTS, formerly assistant chief geologist of the Union Oil Company, past president of the Pacific Coast Section of the American Association of Petroleum Geologists, has joined the staff of the Richfield Oil Company as chief geologist.

DR. CARL F. EYRING, professor of physics and dean of the College of Arts and Sciences at Brigham Young University, has been appointed president of the re-

cently created New England Mission of the Latter Day Saints Church. Dr. Eyring will have headquarters in Boston.

THE proprietors of *The Lancet* have appointed Dr. Egbert Morland as editor in succession to the late Sir Squire Sprigge. Dr. T. F. Fox and Dr. M. H. Kettle have been appointed assistant editors.

PROFESSOR OTTO J. SCHMIDT, who recently received the title of "Hero of the Soviet Union" for leading the North Pole expedition, has been named director of the Institute of Theoretical Geophysics at Moscow. The executive committee of the Academy of Sciences of the U. S. S. R. has voted to reorganize the institute and centralize in its hands all scientific research on the stratosphere and the troposphere in the Soviet Union.

BY an order of the Committee of Privy Council, made after consultation with the Medical Research Council and with the president of the Royal Society, Dr. L. J. Witts, professor of medicine in the University of London and physician to St. Bartholomew's Hospital, and Dr. G. E. Gask, emeritus professor of surgery in the University of London, have been appointed members of the British Medical Research Council, in succession to Sir Thomas Lewis and Sir David P. D. Wilkie, who retire in rotation on September 30.

THE *Journal* of the American Medical Association states that members of a commission authorized by the recent session of the legislature of New York State to survey the prevalence of cancer in the state and facilities for treatment were recently announced. Six members of the legislature were appointed by officials of that body and the following physicians were named by Governor Lehman: Drs. Edward S. Godfrey, Jr., Albany, state health commissioner; James Ewing, director of cancer research, Memorial Hospital for the Treatment of Cancer and Allied Diseases, New York, and Floyd S. Winslow, Rochester, last year president of the Medical Society of the State of New York. The commission has an appropriation of $15,000 and will report to the 1938 legislature.

THE Committee on Scientific Research of the American Medical Association has awarded grants to Dr. Joseph Krafka, Jr., professor of microscopic anatomy at the University of Georgia, for the purchase of a seriograph with which to make elastometric measurements on muscle and connective tissue to extend analysis of the rôle of mechanical factors in the production of arteriosclerosis; to Dr. Peter Heinbecker, of the School of Medicine of Washington University, St. Louis, for an investigation of the pituitary regulation of water exchange in the dog; and to Margaret Lasker, New York, to aid an investigation of the incidence and distribution of pentosuria and fructosuria in the population.

DR. CLIFFORD W. CHAPMAN, pharmacologist of the Department of Pensions and National Health, Ottawa, Canada, has leave of absence for two years, having been invited by the government of China to occupy the chair of pharmacology in the National Health Organization at Nanking. It is expected that he will take up his work on October 1.

DR. Z. I. KERTESZ, associate chemist at the New York State Experiment Station at Geneva, has been granted a year's leave of absence by Cornell University, to accept a fellowship from the Rockefeller Foundation for study of the pectin enzymes under Professor Hans von Euler at Stockholm.

DELEGATES appointed to represent the United States at the eleventh International Dairy Congress to be held in Berlin from August 21 to 29 include, in addition to Dr. O. E. Reed, chief of the Bureau of Dairy Industry of the U. S. Department of Agriculture, who will lead the delegation, Dr. A. C. Dahlberg, head of the Dairy Division of the New York State Agricultural Experiment Station, Geneva; H. P. Davis, Nebraska State College of Agriculture, Lincoln; Fordyce Ely, University of Kentucky College of Agriculture, Lexington; Dr. C. L. Roadhouse, California State College of Agriculture, Davis; A. W. Rudnick, Iowa State College of Agriculture, Ames; C. N. Shepardson, Texas State College of Agriculture, College Station; and T. G. Stitts, Farm Credit Administration, Washington.

DR. G. J. HUCKER, chief in research in bacteriology at the New York State Experiment Station at Geneva, will sail from San Francisco on August 18 for New Zealand, where he will deliver a series of lectures and confer with public health officials, dairy scientists and veterinarians on the detection and control of mastitis in dairy cattle under the auspices of the New Zealand Ministry of Agriculture.

DR. FORREST SHREVE and Dr. T. D. Mallery, of the Desert Laboratory of the Carnegie Institution of Washington at Tucson, Ariz., and Dr. Lee R. Dice, of the University of Michigan, left El Paso, Texas, on July 21 for a biological reconnaissance of the Mexican State of Chihuahua.

KARL P. SCHMIDT, curator of reptiles and amphibians, and D. Dwight Davis, assistant curator of anatomy, at the Field Museum of Natural History, have left Chicago to collect reptiles and mammals for the museum in the Chisos Mountains in southwestern Texas. Tarleton Smith, of the U. S. National Park Service, is cooperating in the expedition. A scientific

report will be prepared on reptiles of the Big Bend region, under Mr. Schmidt's direction.

GERALD FITZGERALD and J. B. Mertie, Jr., of the U. S. Geological Survey, who will make topographic surveys and geologic investigations in the Goodnews Bay district and adjacent parts of southwestern Alaska where there have been recent discoveries of platinum-bearing deposits, and T. W. Ranta, who will make topographic surveys in the Alaska Range region at the head of Copper River, are now on their way to the Territory.

THE Executive Committee of the American Association of Anatomists has voted to hold the next annual meeting at the School of Medicine of the University of Pittsburgh on April 14, 15 and 16, 1938.

IT has been decided by the Royal College of Surgeons of England that under the Moynihan bequest not less than three, or more than five, lectures on the results of research in its application to surgery shall be given in alternate years by a lecturer who shall be styled the Moynihan lecturer.

IT is planned to amalgamate the Institute of Hygiene, London, with the Royal Institute of Public Health. They will in future be known as the Royal Institute of Public Health and Hygiene.

WILLIAM BINGHAM, 2D, of Boston, has given $300,000 to the Boston Dispensary to complete the building of its Diagnostic Hospital and to finance its operation. The donation, supplementing a previous gift of $400,000 made by him in April, will be devoted to the creation of a medical center for the rural physicians of New England, which will be the only one of its kind. The object of the gift is "to make it possible for patients needing diagnosis, patients from any corner of New England and from any economic group to get the latest medical advice and for the country doctor to profit from the knowledge and experience of specialists."

A SEISMOLOGICAL observatory has been established at the University of Queensland in Brisbane. Hitherto there has been no such observatory in Australia north of Sydney. The station has provided a missing link in the chain of seismological observatories in Sydney, Melbourne, Adelaide and Perth. According to *The Courier-Mail* "interest in the creation of a seismological station at Queensland was first aroused as a result of the earth tremor at Gayndah in April, 1935. The first practical move was made anonymously in that year by a former student of the department of geology in the early days of the university. His offer to provide a Milne-Shaw seismograph was accepted with enthusiasm. Later, when it was considered desirable to have an additional instrument, so that the Northern-Southern component might be determined, as well as the Eastern-Western one, the Council for Scientific and Industrial Research provided the second machine last year."

ACCORDING to *Nature* the Kyoto Imperial University has accepted a donation equivalent to about $50,000 from the Osaka Electric Railway Company towards the building of an observatory on the southern peak of Ikomasan at a height of 640 meters. The observatory will include a main building with a 9-meter dome, a solar laboratory, housing for a reflector and a dormitory. The equipment of the solar department of the Kwasan Observatory will be transferred to the new site, in addition to other instruments including the 80-cm. Tomkins reflector. Later a museum devoted to astronomical exhibits and those of allied sciences will be built near the Ikomasan Observatory. Professor Yamamoto will be the director of the group. The Kwasan Observatory will then become a purely academic institution.

DISCUSSION

SPORES OF CAMBRIAN PLANTS

THE recent discoveries of Silurian land plants in association with the graptolite genus *Monograptus* in Victoria, Australia, by Lang and Cookson[1] have extended our knowledge of a terrestrial flora antedating by millions of years the celebrated Devonian Rhynia flora.

There are among rocks of Lower Paleozoic age a number of carbonaceous sediments which presumably are composed largely of plant debris. Kuckersite is a boghead from the Ordovician of Esthonia that Zalessky[2] has described as consisting almost exclusively of *Gleocapsa*-like unicellular algae.

Professor A. C. Lane and Professor E. C. Jeffrey have given me specimens of the Upper Cambrian "Kolm" or "Swedish oil shale." This sediment from the district of Ost-Gotland is rather peculiar among oil shales. The color is black, the luster dull (rarely resinous in small areas on the surface) and the fracture cubic or conchoidal. The black shale gives little indication of distortion. It occurs in lenses of variable dimensions.

With the aid of a surface maceration treatment with Schultz's mixture and subsequent neutralization with ammonium hydroxide, it has been possible to obtain serial nitrocellulose peels, both vertically and transversely, through the samples.

[1] *Phil. Trans. Roy. Soc. Lond.*, B., 224: 421–449, 1935.
[2] *Ann. Soc. Pal. Russ.*, 25, 1917.

Several scores of well-preserved, small, spherical spores have been found in the ground-mass of finely divided "black" debris. It is this spore content which arrests our attention.

The spores bear the typical triradiate scar characteristic of pteridophytes. The spores vary in diameter from 65 to 75 micra. Although the color of the boghead is dark brown to "black," bleaching with chlorine or oxygen readily restores a bright yellow resinous color.

Similar spores are abundant in Upper and Middle Paleozoic rocks. Perhaps the most celebrated are those of *Sporocarpon furcatum* Dawson (*Foerstia ohioensis* White and Stadnichenko). In this plant, beautifully preserved tetrads are present in practically all specimens which I have studied. White and Stadnichenko[3] and Kidston and Lang[4] have published excellent figures of the tetrads.

Sporocarpon furcatum is generally considered as an alga,[5] because the thalloid body so far as known consists of small, simple, terminal dichotomously forked branches, occasionally circinnately coiled. In answer to letters of inquiry, both Professor Pia, of Vienna, and Professor Kräusel, of Frankfort-am-Main, the leading investigators of Paleozoic algae, say that they have not seen specimens. Kidston and Lang suggest that the spores are "resistant" and cutinized, and thereby avoid a dogmatic interpretation of systematic position. However, the thallus-like terminal branches are lignitized, as can be readily demonstrated by their dissolution with nitric acid and strong alkali. No algae are known to bear cutinized or resistant spores with the tetrad triradiate scar.

Thus we reach the inevitable choice between two possibilities: either the Cambrian spores from Swedish oil shale are those of terrestrial plants which had attained the pteridophytic level of development or they represent algal-like plants which progressed far along the direction towards the production of resistant spores. It is in this latter light that Kidston and Lang have viewed *Sporocarpon*.

It is not possible that the Cambrian spores from Sweden are related to any of the several species of *Pachytheca*. *Pachytheca*[6] is a genus of Silurian and Devonian calcareous organisms presumably algal in nature. These fossils are megascopic in size and have, at times, been considered to be calcitized eggs of trilobites. There is present, in well-preserved specimens, a large central cavity surrounded by a zone of radiating tubes, some of which are branched. No spores of *Pachytheca* are known. Some investigators[7] have called attention to the possibility that *Pachytheca* itself may be the fructification of a *Nematophyton*-like plant.

The Cambrian spores, for which no name is here proposed, are quite different from any other known Paleozoic spores. They conform most closely to those of the Psilophytales in size, lack of ornamentation and the proportionately large triradiate scar.

The boghead coals are conventionally interpreted as algal sapropelic carbonaceous sediments. The celebrated Permian boghead from Autun in France is variously considered to be algal, spore or even sphaerulitic. A boghead is a sediment which has the physical characteristics of a cannel coal but with a high "kerosene" content. It can be ignited with the flame of a match and yield the familiar odors of burning petroleum. The evidences upon which the algal opinion is based are not convincing. Even Zalessky's figures of Kuckersite are not persuasive.

The Swedish Kolm has the general appearance of a Carboniferous cannel coal. True cannels are composed chiefly of cutinized spores of various pteridophytes. The Cambrian age of the Swedish oil shale is not disputed by geologists. It is found in the Upper Cambrian with a characteristic trilobite fauna.[8] The sediment is properly termed a boghead, although specimens shrink and crack only slightly upon exposure to air. The shrinkage usually observed in fresh specimens of bogheads is due to the evaporation of volatile ingredients.

The chief interest in these early plant structures centers in their remote geological age. They are, as far as I have been able to ascertain, not only the oldest recognized spores but also are intriguingly suggestive of the antiquity of the tendency toward the attainment of the land-habit.

This study is part of an investigation carried out with the aid of a grant from the Marsh Fund of the National Academy of Sciences.

WILLIAM C. DARRAH

BOTANICAL MUSEUM,
HARVARD UNIVERSITY

[3] *Econ. Geol.*, 18: 238–252, 1923.
[4] *Trans. Roy. Soc. Edinb.*, 53: 597–601, 1924.
[5] M. Hirmer, "Handbuch d. Palaobotanik," 1: 109, 1927.
[6] P. E. Raymond, *Bull. Mus. Comp. Zool.*, 55: 165–171, 1931.

A LAWN MARVEL

THE slime-moulds are probably survivors of that period in the history of life on the planet when the distinction between animals and plants had not yet been established. (To be sure, it is not clear even now.) They have animal affinities—amoeboid movement—in the vegetative stage and plant affinities—spore formation—in the reproductive stage. They creep about in rich soil, under leaves and in the spaces in rotten wood in search of food, but when growth is

[7] See D. H. Scott, "Paleobotany" in Encyclopedia Britannica, 11th ed.
[8] *Olenus* zone; *Peltura* sub-zone.

over and they are ready to provide for the next generation, they issue into the light and form sporangia of many and often beautiful shapes in positions favorable for scattering their spores.

One of these interesting organisms is *Physarum cinereum* Persoon. McBride describes it as common in New England and west to the Black Hills and the Pacific Coast. I have not examined the literature in detail, but I feel sure its occurrence in the southern United States can not have been overlooked. I have seen it often in North Carolina. Twice have I found it in its marvelous habit of "fairy ring" formation—once some four years ago on my lawn in Wake Forest, N. C., and again there this morning. The man mowing the lawn early to-day reported a lot of "sut or something" on the grass; he "reckoned some dog with it on his back had been wallowing in the yard." From the porch I at once recognized the "fairy ring" of Physarum. There were three complete rings. One was eleven feet in diameter, the other two six feet. The one seen previously was fifteen feet in diameter. Beside these three, there were fragments of several others here and there. These observations not only extend McBride's range of this species, but also quite enormously the size of its rings. He makes it "a few inches."

The discoloration of the grass in a circular band about four inches wide is, of course, due to the plasmodium at maturity creeping up and covering the grass blades with their dark sporangia. These little masses of spores become ashy gray as they mature. The formation of the ring may be explained in this way. The small plasmodium forms and begins its growth at the center of the future ring. Approximately circular itself, it creeps outward in search of food in the soil and the disc becomes a band which extends as it grows. This continues until the organism is grown, the size of the ring being in proportion to the favorableness of the conditions. Then it extends no more, the naked protoplasm creeps out of the nourishing soil and ascends the grass blades for the making and dissemination of its spores.

WILLIAM LOUIS POTEAT

WAKE FOREST COLLEGE

AGE OF THE URANINITE FROM THE RUGGLES MINE, GRAFTON CENTER, N. H.

DURING the summer and early autumn of 1936, I collected a large number of uraninite specimens from the Ruggles mine, which is located one and a half miles north 40° west from Grafton Center (Cardigan quadrangle), N. H. The larger crystals, up to three quarter inch, are usually much altered; however, in places small well-developed crystals, which appeared to be quite fresh, occurred in association with albite, the latter intergrown with apatite. The freshest crystals were broken down in stages and hand sorted under a binocular until all visible foreign material was removed. From this 82 milligrams, having a specific gravity of 7.02, were sent to Frederick Hecht, of Vienna, for a microchemical analysis. His determination revealed a very pure uraninite having 3.37 per cent. lead; 0.38 per cent. thorium; 76.38 per cent. uranium with 0.04 per cent. sulfur. If we assume the sulfur to be combined with ordinary lead and, therefore, deduct a corresponding amount from the lead determined, the analysis would give, by Kovarik's constants and the logarithmic formula, simplified as in the report of the Committee of the Estimation of Geologic Age of April 27, 1935, page 2, and the latest values furnished by A. Kovarik for the disintegration of uranium and thorium, an age of 302 millions of years, which seems to be Devonian.[1]

B. M. SHAUB

SMITH COLLEGE

THE DESIGNATION OF CLONAL GENERATIONS

THE use of the word clone, suggested by Webber (SCIENCE, 18: 501–503, 1903), has come to be generally used to designate horticultural varieties propagated asexually by budding or grafting. Varying bud strains become new clones and if valuable are given varietal names. Several have already been awarded United States patent numbers.

In the study of clonal varieties and strains in clonal selection, it is frequently desirable to use some method to designate the number of selections in lineal sequence made in certain bud progeny lines. For this purpose the writer has in his notes made use of the symbols C_1, C_2, etc., to designate the clonal generations, as F_1, F_2, etc., are used in genetical studies to designate the filial generations. This use is illustrated in the genealogical records of individual citrus trees in the variety studies of the Citrus Experiment Station, of which the following is a sample:

P (*Corona Lemon Co., 1–27–11 on Sweet Orange roots, 1893*)
↓
C_1 (*Citrus Exp. Sta. ABC–22–15 on Sour Orange roots, 1918*)
↓
C_2 (*Citrus Exp. Sta. 3B–10–6 on Bessie Sweet Or. roots, 1927*)
↓
C_3 (*Citrus Exp. Sta. S1–B1–1 to 11 incl. on Rough Lemon roots, 1937*)

Some uniform method of designating clonal generations should be used, and the writer suggests the consideration of the method here described.

R. E. CARYL

CITRUS EXPERIMENT STATION
RIVERSIDE, CALIF.

[1] Private communication from Dr. A. C. Lane.

THE NEEDS OF THE MIMETIC THEORY

PROFESSOR SHULL, in his reply to my criticism of his views[1] objects to being "called upon to accept mimicry until it has been clearly disproved." But why not accept a theory which does give an explanation of multitudinous facts in relation to the whole subject of the coloration of insects until some other equally comprehensive theory has been adduced to compete with it?

I take exception to Professor Shull's inclusion of myself among those who "are all agreed that mimicking color, form or habit arose by one mutation": indeed, I did not know that it was possible for any one to hold that view nowadays, for it is "ancient history." My statement that "genetics are primarily concerned with the basic changes which result in *production* of a certain appearance, whereas the problem for the mimetist is not 'how or why' a habit or pattern is produced but how or why it *survives*" does not justify Professor Shull's statement that this view "implies the one-mutation origin of the imitations," nor the conclusions which he draws from this view. He does not allude to the concepts of evolution of the gene complex or to modifying factors, and I venture to quote the following by E. B. Ford from "Mimicry":[2] "It is well known that some of the most elaborate mimetic adaptations, involving varied and profound modifications, are controlled by the operation of a single gene. This must have arisen spontaneously by mutation, and consequently it has been argued that the mimetic resemblances which it controls did so too.

"Such reasoning is evidently fallacious, for it will now be apparent that we have no ground for thinking that a gene exercised the same effect at its first appearance as it does to-day; a consideration first clearly stated in its evolutionary aspect by Fisher."[3] Ford points out that certain mimetic forms differ from each other in a manner known to be due to single-factor differences. "But we are none the less entitled to regard each of them as the product of slow and continuous evolution."

Regarding experiments with animals I do not think Professor Shull is justified in saying that "I missed most of the point to this caution." I am in complete agreement as to the necessity of careful experiments.[4]

Reighard's work dealt with fishes, but I have no first-hand knowledge of the subject of coloration of marine animals and concerned myself only with insects, which I have studied in nature. McAtee's results have been so severely criticized for the manner of their presentation that I preferred not to discuss them.[5] Finally, I agree with Professor Shull that mimicry needs a deeper foundation, but I would not therefore pay no attention to its breadth.

G. D. HALE CARPENTER

SCIENTIFIC BOOKS

RECENT BOOKS ON PHYSICS

An Elementary Survey of Modern Physics. By G. F. HULL, New York, Macmillan, 1936. 457 pages. $3.50.

"MODERN physics" is pretty well established usage for that part of the science which has developed since about 1895 and which covers electrons, positive rays, x-rays, radioactivity, atomic and molecular structure. All this might well be called atomistics or corpuscular physics, for it can not go on being called modern indefinitely.

In the college curriculum it is generally found that there is no time for such topics in the traditional one-year introductory course, so more and more it has become the custom to have second-year courses covering these modern developments. It is for such a course that Professor Hull's book is intended, and for such use it seems to the reviewer to be admirably suited. The style used is quite breezy and journalistic, but apparently not at the cost of as great accuracy as is possible in an elementary account.

This book ought to be quite useful to scientists in other fields than physics who never took the second course or whose physics was taken many years ago. It seems to be the best book available at present for the biologist, chemist or astronomer, who would like to read about the new developments in physics in an elementary way while yet getting something more solid than is offered in the popular books of the book trade.

Some idea of the scope of the book is given by considering the chapter headings: (1) Molecules in swarms; (2) We discover and weigh the electron. We weigh atoms and discover isotopes; (3) Simple properties of orbits; the discovery of the nuclear atom; (4) Radiation; (5) The photo-electric effect; (6) Atomic spectra and the Bohr theory; (7) X-rays; (8) Electron tubes; (9) Electrical phenomena in gases and solids; (10) The Zeeman and Raman effects; (11) Radioactivity; spontaneous transmutation of elements; (12) The beginning of artificial transmutation; (13) Cosmic rays; (14) Transmutation of the elements. Induced or artificial radioactivity; (15)

[1] SCIENCE, 85: 496–498, 1937.
[2] Methuen's Monographs on Biological Subjects, pp. 106–107, 1933.
[3] *Trans. Ent. Soc. Lond.*, 75: 269–78, 1927. See also Fisher, *Biol. Rev.*, 6: 345–68, 1931.
[4] *Trans. Ent. Soc. Lond.*, October 8, 1921, pp. 2–7.
[5] See *Proc. Ent. Soc. Lond.*, 7: 79–105, 1932 (1933) and *ibid.*, 8: 113–126, 1934.

Waves, particles, new atom pictures; (16) Limitations imposed by nature—the uncertainty principle; (17) Modern applications of physics.

E. U. CONDON
PRINCETON UNIVERSITY

The Physics of Electron Tubes. By L. R. KOLLER. Second edition. McGraw-Hill Book Company.

THE author has presented a simple, clear survey of the principles of electronics, together with a wealth of practical information. This book will be welcomed by the engineer or student who wishes an accurate non-mathematical account of the physics involved in the electronic devices which have become so important in present-day industry. Those working in the field covered by the book will find a great deal of valuable detailed description of the technique used in the preparation of electron tubes.

A very complete account of thermionic emission is given in the first few chapters. This treatment includes not only thoriated tungsten and oxide coated emitters but also the less well-known caesium treated cathodes. The problem of electrical discharge in gases is very adequately and clearly covered. Sections dealing with photoelectric and photoconductive phenomena provide a clear practical outline of the field and include numerous tables and curves describing the properties of photoactive materials.

The book also contains a large amount of useful information on such subjects as the use of getters for producing high vacua, the measurement of temperatures inside of vacuum tubes and the general methods used in electron tube work.

In addition to the material contained in the first edition, the second edition includes a discussion of secondary emission multipliers, the ignitron, and various new devices employing electron optics. The book is well printed and illustrated with many diagrams and charts which clarify the text.

V. K. ZWORYKIN
R.C.A. MANUFACTURING COMPANY,
CAMDEN, N. J.

L'Unité de la Force et L'Unité de la Matière dans la Conception Physique Uniforme du Monde. By JAN BAŠTA. Pp. 103. Masarykova Akademie Práce, Prague, 1936.

IN this monograph the author maintains, largely by qualitative arguments, the unity of all force and the unity of all matter. The latter hypothesis leads him to the concept of a cosmic ether composed of proto-atoms, which, under certain conditions, may manifest themselves as the chemical elements of ordinary matter. Rejecting the concept of action at a distance, he assumes that forces are transmitted from one protoatom to another by immediate contact. To maintain the unity of force, he supposes that elementary forces possess both a longitudinal and a transverse aspect, the first accounting for gravitational attraction and the second for electromagnetic interaction. By developing a theory of elasticity of the ether he computes a velocity of gravitational waves between 1.73 and 2.00 times the velocity of light.

The author dislikes both the special and the general theories of relativity. He prefers to explain the negative result of the Michelson-Morley experiment on the ground of ether entrainment, without, however, offering any escape from the difficulties to which that hypothesis leads.

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Atomic Physics. By MAX BORN. New York: G. E. Stechert and Co. pp. vii + 352. 1936.

THE book is characterized by a reasonably comprehensive introduction of about three chapters dealing with phenomena from the experimental side. A brief review of the Bohr theory follows, mention is made of the matrix mechanics, and the remainder of the book deals with the wave mechanical theory. At the end there is an appendix, in which some of the mathematical expressions are developed in greater detail.

The author's prominence in the field of atomic structure, of course, insures an authoritative statement of the situation. The book deals with the relative elementary aspects of the subject; but it does not always form very easy reading. Although it is presumably written for one who has not made a study of the subject before, the nature of the language in the discussions is such that a previous knowledge of wave mechanics and of the problems which confront the theory of atomic structure would be almost essential for a proper comprehension of the contents of the book.

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SPECIAL ARTICLES

APHIS RESISTANCE IN BREEDING MOSAIC-ESCAPING RED RASPBERRIES

PREVIOUS investigation[1] has indicated that certain red raspberry varieties are either immune to red raspberry mosaic or non-infectible by its common vectors. These varieties are now either unobtainable for breeding stock or they are objectionable because of unde-

[1] W. Howard Rankin, *N. Y. (Geneva) Agr. Exp. Sta. Bul.*, 543, 1927.

sirable fruit or plant characters. In experiments to be reported in detail elsewhere we have found that the Lloyd George variety, an outstanding parent from the standpoint of fruit quality,[2] completely escapes mosaic infection in the Puyallup Valley of western Washington by virtue of its resistance to the aphid vector, *Amphorophora rubi* Kalt., and that it transmits this characteristic when hybridized with a susceptible variety.

During the three-year period of our investigations no effective vector other than *A. rubi* was found upon the red raspberry. That varieties grown in the field differ greatly in their susceptibility to this aphid is shown in the following table.

TABLE I

FIELD COUNTS OF *Amphorophora rubi* KALT., MADE UPON TEN RED RASPBERRY VARIETIES IN 1936

Variety	June 25		July 23	
	Range of aphid counts per cane	Ave. no. aphids per cane	Range of aphid counts per cane	Ave. no. aphids per cane
Antwerp	0–2	0.2	0–5	1.8
Chief	8–104	42.7	3–108	41.1
Cuthbert	0–16	5.0	0–30	10.8
Herbert	0–3	0.3	0–6	1.8
Latham	2–27	14.7	4–49	23.1
Lloyd George	0–0	0.0	0–0	0.0
Marlboro	1–9	4.6	4–42	16.8
Newburgh	0–6	2.0	0–9	4.6
Newman	4–17	10.1	1–26	12.5
Viking	0–39	16.0	3–83	32.8

Although populations of *A. rubi* on susceptible varieties varied throughout the summers of 1935 and 1936, repeated field counts were sufficiently consistent to permit a general classification of varieties relative to aphid susceptibility. Antwerp, Herbert and Newburgh show marked resistance to the vector, while the other varieties, except Lloyd George, show greater susceptibility. Observations indicate also that the rate of spread of mosaic in the 10 varieties appears to be directly proportional to their relative aphid populations. Many field counts were made upon Lloyd George, in addition to those shown in the table and all gave negative results. The only specimens of *A. rubi* found upon Lloyd George were a few winged individuals that probably landed there accidentally while in flight. That such chance visitors do not infect the Lloyd George is shown by the fact that red raspberry mosaic was not observed on this variety in the field, although artificial infection by graftage resulted in the development of distinct mottling, indicating that Lloyd George is susceptible to the virus. In another experiment, a Lloyd George plant that remained in constant contact with a mosaic-infected, aphid-infested Newman plant throughout one summer did not develop symptoms of mosaic during two years thereafter.

In greenhouse experiments, stem mothers were placed upon individual plants under cheesecloth cages. Large populations developed upon highly susceptible varieties; little reproduction occurred upon more resistant varieties; and the aphids could not maintain themselves on Lloyd George. They gradually died without reproducing after wandering about over the cage and the plant, apparently without feeding. Greenhouse testing of varieties by means of cages proved to be a convenient, rapid and accurate method of determining relative susceptibility to *A. rubi* and is a valuable aid in the breeding of resistant varieties.

Both field counts and greenhouse tests were conducted with hybrids resulting from crossing several red raspberry varieties. Of 31 hybrids of Lloyd George × Cuthbert and the reciprocal cross, six proved to be completely resistant and several others were highly resistant. Of six hybrids of Lloyd George × Latham and the reciprocal, three were resistant and three susceptible. Of nineteen hybrids of susceptible parents, all were definitely susceptible.

The numbers of plants whose relative susceptibility was definitely determined were too small to permit genetic analysis. The behavior of *A. rubi* when confined to Lloyd George plants under cages indicates that resistance probably results from a lack of suitable food for the insect rather than the presence of an actively repellent substance. Such a negative character may be expected to be a recessive. The data thus far obtained support this theory.

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[2] C. D. Schwartze, *Proc. Amer. Soc. Hort. Sci.*, 30: 113–116, 1933; 32: 411–415, 1934.

THE SIMILARITY OF ACTION OF PURIFIED CORTICAL ADRENAL EXTRACTS TO CRYSTALLINE ANDROSTERONE AND TESTOSTERONE

HAVING shown that crystalline androsterone and testosterone can initiate the lengthening of the ovipositor of the female bitterling,[1] we were interested in the observation of Barnes, Kanter and Klawans.[2]

[1] I. S. Kleiner, A. I. Weisman and D. I. Mishkind, *Proc. Soc. Exp. Biol. and Med.*, 35: 344, 1936; I. S. Kleiner, A. I. Weisman, D. I. Mishkind and C. W. Coates, *Zoologica*, 21, part 4: 241, 1936.

[2] B. O. Barnes, A. E. Kanter and A. H. Klawans, SCIENCE, 84: 310, 1936.

They stated that crude ether extracts of the adrenal cortex of the dog had this effect also.

We can now report that purified extracts of adrenal cortex, prepared for administration to human beings and obtained from three different sources,[3] also possess this property. These tests were repeated several times with each preparation with positive results.

Several questions arise; among them are the following. Is the reaction of adrenal cortical extracts caused by some oxidation product of a cortical substance such as Mason, Myers and Kendall have prepared?[4] Is it due to a preformed substance which stimulates the growth of the capon's comb, such as the one which was isolated from adrenal cortex by Reichstein?[5] Or is this effect caused by the cortical factor or factors essential to life?

If this test is a reaction for a specific cortical hormone as well as for the "male hormones" it may prove to be a more valuable test than if it were for the latter alone.

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PERMEABILITY OF THE BLOOD-C. N. S. BARRIER TO SODIUM BROMIDE IN EXPERIMENTAL POLIOMYELITIS[1]

CHANGES in the permeability of the blood-C. N. S. barrier are known to occur in a number of pathological conditions involving the central nervous system.[2] Perhaps the most widely used method for determining such alterations in permeability is that devised by Walter.[3] The concentration of bromide in the serum and spinal fluid is determined after oral administration of NaBr, and the degree of permeability given by a ratio (concentration in serum/concentration in spinal fluid) which is expressed as the permeability quotient (P. Q.)

In the present investigation slight modifications were made of Walter's original method. For example, NaBr was administered subcutaneously twice daily for two consecutive days. Each injection consisted of forty-five milligrams per kilogram body weight. Approximately eighteen hours after the last injection, samples of blood and spinal fluid were obtained and quantitatively analyzed for NaBr. Chemical analyses were made by methods differing in several respects from those employed by Walter. These modifications were necessary to adapt the method to the smaller amount of spinal fluid available from monkeys. Since the NaBr persisted in the body fluids for several weeks following administration, only one test was made on each animal, *i.e.*, the P. Q. was not determined on the same animal for both the preparalytic and paralytic stages.

The average P. Q. value for 19 normal monkeys was found to be 1.72 with a probable error $(= \pm 0.8453 \frac{\Sigma(v)}{n\sqrt{n-1}})$ of ± 0.029. Eighteen preparalytic monkeys gave an average value of 1.01 with a probable error of ± 0.0137. The value for frankly paralyzed monkeys was approximately the same as for the previous group, the average P. Q. for eleven animals being 0.99 with a probable error of ± 0.0132.

The data obtained so far indicate that NaBr passes into the spinal fluid more readily in poliomyelitic (low P. Q.) than in normal monkeys (high P. Q.). Since a low P. Q. value for Br^- is generally attributed to an increase in blood-C. N. S. barrier permeability,[2] the results of the present investigation point to the occurrence of a similar change in experimental poliomyelitis.

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[3] For these potent, standardized adrenal cortical extracts we are indebted to Professor W. W. Swingle and Dr. W. M. Parkins, of Princeton University, Professor Frank A. Hartmann, of the Ohio State University, and Dr. Oliver Kamm, of Parke, Davis and Company.

[4] H. L. Mason, C. S. Myers and C. C. Kendall, *Jour. Biol. Chem.*, 116: 267, 1936.

[5] T. Reichstein, *Helv. chim. acta*, 19: 223, 1936.

[1] This work was supported by a grant from the President's Birthday Ball Commission for Infantile Paralysis Research.

[2] S. Katzenelbogen, "The Cerebrospinal Fluid and Its Relation to the Blood." The Johns Hopkins Press, Baltimore, 1935.

[3] F. K. Walter, *Zeits. f. d. ges. Neurol. u. Psychiat.*, 95, 522, 1925.

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